DOE/CF-0128
Volume 1

Department of Energy
FY 2018 Congressional Budget Request

National Nuclear Security Administration

Federal Salaries and Expenses
Weapons Activities
Defense Nuclear Nonproliferation
Naval Reactors

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May 2017 Office of Chief Financial Officer Volume 1

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FUNDING BY APPROPRIATION

	FY 2016 Enacted	FY 2017 Annualized CR*	FY 2018 Request	FY 2018 vs FY 2016 $	FY 2018 vs FY 2016 %
	($K)				
Department of Energy Budget by Appropriation					
Energy and Water Development, and Related Agencies					
Energy Programs					
Energy Efficiency and Renewable Energy	2,069,194	2,069,059	636,149	-1,433,045	-69.3%
Electricity Delivery and Energy Reliability	206,000	205,608	120,000	-86,000	-41.7%
Nuclear Energy	986,161	984,286	703,000	-283,161	-28.7%
Fossil Energy Programs					
Fossil Energy Research and Development	632,000	630,799	280,000	-352,000	-55.7%
Naval Petroleum and Oil Shale Reserves	17,500	17,467	4,900	-12,600	-72.0%
Strategic Petroleum Reserve	212,000	211,597	180,000	-32,000	-15.1%
Strategic Petroleum Account	0	0	8,400	+8,400	N/A
Northeast Home Heating Oil Reserve	7,600	7,586	6,500	-1,100	-14.5%
Total, Fossil Energy Programs	**869,100**	**867,449**	**479,800**	**-389,300**	**-44.8%**
Uranium Enrichment Decontamination and Decommissioning (UED&D) Fund	673,749	767,014	752,749	+79,000	+11.7%
Energy Information Administration	122,000	121,768	118,000	-4,000	-3.3%
Non-Defense Environmental Cleanup	255,000	254,515	218,400	-36,600	-14.4%
Science	5,347,000	5,336,835	4,472,516	-874,484	-16.4%
Advanced Research Projects Agency - Energy	291,000	290,446	20,000	-271,000	-93.1%
Nuclear Waste Disposal	0	0	90,000	+90,000	N/A
Departmental Administration	130,971	130,722	145,652	+14,681	+11.2%
Office of the Inspector General	46,424	46,336	49,000	+2,576	+5.5%
Title 17 - Innovative Technology Loan Guarantee Program	17,000	14,920	0	-17,000	-100.0%
Advanced Technology Vehicles Manufacturing Loan Program	6,000	5,989	0	-6,000	-100.0%
Total, Energy Programs	**11,019,599**	**11,094,947**	**7,805,266**	**-3,214,333**	**-29.2%**
Atomic Energy Defense Activities					
National Nuclear Security Administration					
Weapons Activities	8,846,948	8,830,130	10,239,344	+1,392,396	+15.7%
Defense Nuclear Nonproliferation	1,940,302	1,936,614	1,793,310	-146,992	-7.6%
Naval Reactors	1,375,496	1,372,881	1,479,751	+104,255	+7.6%
Federal Salaries and Expenses	363,766	363,937	418,595	+54,829	+15.1%
Total, National Nuclear Security Administration	**12,526,512**	**12,503,562**	**13,931,000**	**+1,404,488**	**+11.2%**
Environmental and Other Defense Activities					
Defense Environmental Cleanup	5,289,742	5,279,686	5,537,186	+247,444	+4.7%
Other Defense Activities	776,425	774,949	815,512	+39,087	+5.0%
Defense Nuclear Waste Disposal	0	0	30,000	+30,000	N/A
Total, Environmental and Other Defense Activities	**6,066,167**	**6,054,635**	**6,382,698**	**+316,531**	**+5.2%**
Total, Atomic Energy Defense Activities	**18,592,679**	**18,558,197**	**20,313,698**	**+1,721,019**	**+9.3%**
Power Marketing Administrations					
Southeastern Power Administration	0	0	0	0	N/A
Southwestern Power Administration	11,400	11,378	11,400	0	N/A
Western Area Power Administration	93,372	93,194	93,372	0	N/A
Falcon and Amistad Operating and Maintenance Fund	228	228	228	0	N/A
Colorado River Basins Power Marketing Fund	-23,000	-23,000	-23,000	0	N/A
Total, Power Marketing Administrations	**82,000**	**81,800**	**82,000**	**0**	**N/A**
Federal Energy Regulatory Commission (FERC)	0	0	0	0	N/A
Subtotal, Energy and Water Development and Related Agencies	**29,694,278**	**29,734,944**	**28,200,964**	**-1,493,314**	**-5.0%**
Excess Fees and Recoveries, FERC	-23,587	-15,882	-9,000	+14,587	+61.8%
Title XVII Loan Guarantee Program Section 1703 Negative Credit Subsidy Receipt	-68,000	-67,871	-35,000	+33,000	+48.5%
Sale of Northeast Gas Reserve	0	0	-69,000	-69,000	N/A
Use of Advanced Research Projects Agency - Energy Balances	0	0	-46,367	-46,367	N/A
Total, Funding by Appropriation	**29,602,691**	**29,651,191**	**28,041,597**	**-1,561,094**	**-5.3%**

*The Consolidated Appropriations Act was not available when the Department of Energy developed the FY 2018 Congressional Budget. Therefore, the FY 2017 Annualized CR amounts reflect the P.L. 114-254 continuing resolution level annualized to a full year.

National Nuclear Security Administration
Overview[a]

	(Dollars in Thousands)				
	FY 2016 Enacted	FY 2017 Annualized CR*	FY 2018 Request	FY 2018 vs. FY 2016 $	FY 2018 vs. FY 2016 %
National Nuclear Security Administration					
Federal Salaries and Expenses	363,766	363,937	418,595	+54,829	+15.1%
Weapons Activities	8,846,948	8,830,130	10,239,344	+1,392,396	+15.7%
Defense Nuclear Nonproliferation	1,940,302	1,936,614	1,793,310	-146,992	-7.6%
Naval Reactors	1,375,496	1,372,881	1,479,751	+104,255	+7.6%
Total, National Nuclear Security Administation	**12,526,512**	**12,503,562**	**13,931,000**	**+1,404,488**	**+11.2%**

* The FY 2017 Annualized CR amounts reflect the P.L. 114-254 continuing resolution level annualized to a full year. These amounts are shown only at the congressional control level and above, below that level, a dash (-) is shown.

Overview

The National Nuclear Security Administration (NNSA) FY 2018 Request is $13,931,000,000, an increase of $1,404,488,000 (11.2 percent) above the FY 2016 Enacted level to sustain and modernize the U.S. nuclear stockpile and aging infrastructure; execute international nuclear nonproliferation programs, including efforts to prevent the unauthorized or illegal acquisition of nuclear weapons or weapons usable-material by states or terrorists; and provide safe and effective integrated nuclear propulsion systems to the U.S. Navy. The Request also supports efforts to formulate a comprehensive Government-wide Reform Plan to recruit, train, and maintain a workforce that effectively and efficiently deliver NNSA programs; and align the NNSA federal workforce to meet the needs of today and the future.

The FY 2018 Request is a fiscally-responsible budget that supports the current Program of Record to maintain a safe, secure, and effective nuclear weapons stockpile; modernize our nuclear security enterprise; reduce the threat of nuclear proliferation; and support the U.S. Navy's nuclear propulsion program. NNSA has pursued a disciplined process in defining the requirements to meet nuclear security and non-proliferation policy goals, support the Navy, and support a highly skilled federal workforce.

NNSA Future-Years Nuclear Security Program

Estimates for the FY 2019 – FY 2023 base budget topline for the National Nuclear Security Administration reflect FY 2018 levels inflated by 2.1 percent annually. This outyear topline does not reflect a policy judgement. Instead, the Administration will make a policy judgement on amounts for the National Nuclear Security Administrations' FY 2019 – FY 2023 topline in the FY 2019 Budget, in accordance with the National Security Strategy and Nuclear Posture Review that are currently under development.

The previous administration created a NNSA Program Support account in DOD, which held outyear amounts that OMB would re-allocate from DOD to NNSA in one-year increments during the annual budget formulation process. Going forward, all outyear funding for NNSA will be included in its Future Years Nuclear Security Program, and none in DOD's Future Years Defense Program. This represents a return to regular budget order and this mechanical change will not alter the total planned NNSA resources since NNSA has always included the DOD support amount in its planning for outyear totals.

Public Law Authorizations
- P.L. 106-65, National Nuclear Security Administration Act, as amended
- P.L. 114-328, National Defense Authorization Act for Fiscal Year 2017
- Consolidated Appropriations Act, 2017

[a] The Consolidated and Further Continuing Appropriations Act, 2016, includes one-time rescissions of prior year balances as follows: $19,900,000 for Federal Salaries and Expenses.

Appropriation Summary by Program[a]
Funding

(Dollars in Thousands)

	FY 2016 Enacted	FY 2017 Annualized CR*	FY 2018 Request	FY 2018 vs FY 2016
Federal Salaries and Expenses				
Program Direction	383,666	382,937	418,595	+34,929
Prior Year Balance Rescission	-19,900	-19,000	0	+19,900
Total, Federal Salaries and Expenses	**363,766**	**363,937**	**418,595**	**+54,829**
Weapons Activities Appropriation				
Directed Stockpile Work	3,387,792	3,313,543	3,977,026	+589,234
Science	423,059	427,859	487,521	+64,462
Engineering	131,377	133,996	193,123	+61,746
Inertial Confinement Fusion Ignition and High Yield	511,050	516,185	532,934	+21,884
Advanced Simulation and Computing	623,006	648,095	734,244	+111,238
Advanced Manufacturing Development	130,056	87,705	80,540	-49,516
Infrastructure and Operations	2,279,124	2,408,217	2,803,137	+524,013
Secure Transportation Asset	237,118	256,438	325,064	+87,946
Defense Nuclear Security	682,891	661,512	686,977	+4,086
Information Technology and Cybersecurity	157,588	170,088	186,728	+29,140
Legacy Contractor Pensions	283,887	248,492	232,050	-51,837
Subtotal, Weapons Activities	**8,846,948**	**8,872,130**	**10,239,344**	**+1,392,396**
Use of Prior Year Balances	0	-42,000	0	0
Total, Weapons Activities Appropriation	**8,846,948**	**8,830,130**	**10,239,344**	**+1,392,396**
Defense Nuclear Nonproliferation Appropriation				
Defense Nuclear Nonproliferation Programs				
Global Material Security	426,751	421,255	337,108	-89,643
Material Management and Minimization	316,584	312,507	332,094	+15,510
Nonproliferation and Arms Control	130,203	128,526	129,703	-500
Defense Nuclear Nonproliferation R&D	419,333	413,933	446,095	+26,762
Nonproliferation Construction	340,000	335,622	279,000	-61,000
Subtotal, Defense Nuclear Nonproliferation Programs	**1,632,871**	**1,611,843**	**1,524,000**	**-108,871**
Nuclear Counterterrorism and Incident Response Program	234,390	231,372	277,360	+42,970
Legacy Contractor Pensions	94,617	93,399	40,950	-53,667
Use of Prior Year Balances	-21,576	0	0	+21,576
Subtotal, Defense Nuclear Nonproliferation Appropriation	**1,940,302**	**1,936,614**	**1,793,310**	**-146,992**
Prior Year Balance Rescission	0	0	-49,000	-49,000
Total, Defense Nuclear Nonproliferation Appropriation	**1,940,302**	**1,936,614**	**1,793,310**	**-146,992**
Naval Reactors				
Naval Reactors	1,375,496	1,372,881	1,479,751	+104,255
Total, Naval Reactors	**1,375,496**	**1,372,881**	**1,479,751**	**+104,255**
Total, NNSA	**12,526,512**	**12,503,562**	**13,931,000**	**+1,404,488**

* The FY 2017 Annualized CR amounts reflect the P.L. 114-254 continuing resolution level annualized to a full year. These amounts are shown only at the congressional control level and above, below that level, a dash (-) is shown.

Major Outyear Priorities and Assumptions

Estimates for the FY 2019 – FY 2023 base budget topline for the National Nuclear Security Administration reflect FY 2018 levels inflated by 2.1 percent annually. This outyear topline does not reflect a policy judgement. Instead, the

[a] This table shows FY 2016 enacted level reflected in the FY 2016 appropriations bill.

Administration will make a policy judgement on amounts for the National Nuclear Security Administrations' FY 2019 – FY 2023 topline in the FY 2019 Budget, in accordance with the National Security Strategy and Nuclear Posture Review that are currently under development.

NNSA Overview

Overview

The FY 2018 NNSA Request of $13,931,000,000 implements four major national security endeavors: (1) use science to maintain a safe, secure, and effective nuclear weapons stockpile that deters any adversary and protects our allies; (2) reduce the threat posed by nuclear proliferation and terrorism, including unsecured or excess nuclear and radiological materials both domestically and internationally; (3) prepare to respond to, and mitigate, nuclear and radiological incidents worldwide; and (4) support safe and effective integrated nuclear propulsion for the U.S. Navy.

The FY 2018 Budget Request maintains the current Program of Record to modernize America's nuclear stockpile and infrastructure, and support U.S. Navy nuclear propulsion requirements. The Request also supports the nonproliferation goals outlined in NNSA's *Prevent, Counter, and Respond—A Strategic Plan to Reduce Global Nuclear Threats (NPCR)*.

The FY 2018 Budget Request for **Weapons Activities (WA)** is $10,239,344,000, a $1,392,396,000 (15.7 percent) increase above the FY 2016 Enacted level. Weapons Activities funds programs primarily at eight NNSA Management and Operating (M&O) sites by a workforce of approximately 39,000 people managed by a Federal workforce composed of civilian and military staff. The Request is aligned with Department of Defense (DOD) requirements to ensure the U.S. nuclear deterrent continues to be safe, secure, and effective. The increase in funding is partially offset by continuing NNSA's policy begun in FY 2017 to cap reimbursement of M&O contractor pension costs to the amount of active employees earning one more year of benefits, known as normal cost. Reimbursements were not capped in previous years to help replenish pensions plans that were hit hard from the drop in the stock market in 2008-2009 and demographic changes. NNSA pension plans are now better funded, allowing the continuation of this pension strategy.

The request supports the execution of the Nuclear Weapons Council (NWC) approved 3+2 strategy to consolidate the stockpile to three ballistic missile warheads and two air delivered systems as well other priorities. The Request continues the stabilization of deferred maintenance at NNSA's aging facilities and infrastructure, supports the development and procurement of a new Mobile Guardian Transporter to replace the aging Safeguards Transporter, begins construction for a new facility for about 1,100 federal staff in Albuquerque who currently work in inadequate facilities built in the 1940s and 1950s, and accelerates NNSA's exascale program to ensure the continued viability of future high performance computing platforms. The Request also increases investments in NNSA's plutonium capabilities and the Uranium Processing Facility so NNSA can keep within the $6,500,000,000 cost cap and FY 2025 completion date. The Request continues funding for enriched uranium necessary for tritium-production capabilities while increasing our investments in Research, Development, Test, and Evaluation activities. The WA Request includes funding for Defense Nuclear Security (DNS) to provide protection for NNSA personnel, facilities, nuclear weapons, special nuclear material, and information from a full spectrum of insider and outsider threats. The Request also enhances the Information Technology and Cybersecurity program and continues cybersecurity recapitalization efforts.

The FY 2018 Budget Request for **Defense Nuclear Nonproliferation (DNN)** is $1,793,310,000 a $146,992,000 (7.6 percent) decrease below the FY 2016 Enacted level. The nuclear nonproliferation strategy addresses the entire nuclear threat spectrum by preventing the acquisition of nuclear weapons or weapons-usable materials, countering efforts of state-sponsors of terrorism or terrorists to acquire such weapons or materials, and responding to nuclear or radiological incidents. The DNN Request provides policy and technical leadership to prevent or limit the spread of materials, technology, and expertise relating to weapons of mass destruction; advances technologies that detect the proliferation of weapons of mass destruction worldwide; eliminates and secures inventories of surplus materials and infrastructure usable for nuclear weapons; ensures a technically trained response to nuclear and radiological incidents worldwide; and supports emergency management. The DNN programs require less new budget authority in FY 2018 compared to the FY 2016 Enacted level primarily due to the availability of prior year carryover balances and lower University of California (UC) legacy pension costs. Excluding UC pension payments and DNN construction projects, the FY 2018 Request for core nonproliferation and counterterrorism programs is higher than the FY 2017 Request.

The FY 2018 Budget Request for **Naval Reactors (NR)** is $1,479,751,000, a $104,255,000 (7.6 percent) increase above the FY 2016 Enacted level. This funding supports operations, infrastructure, and development for the Navy's fleet of nuclear-powered aircraft carriers and submarines and funds three major DOE initiatives – the *Columbia*-class Reactor System

Development, Land-based S8G Prototype Refueling Overhaul, and Spent Fuel Handling Recapitalization Project. This funding also provides for Naval Reactors' Federal program direction activities. The NR appropriation provides for safe and effective integrated nuclear propulsion systems for the U.S. Navy.

The FY 2018 Budget Request for **NNSA Federal Salaries and Expenses (FSE)** is $418,595,000, a $54,829,000 (15.1 percent) increase above the FY 2016 Enacted level, which included a one-time prior year rescission of $19,900,000 related to a construction project. Excluding the rescission, the FY 2018 Request reflects a 9.1 percent increase above the FY 2016 Enacted level. The Request provides funding for the salary, benefits, and support expenses of 1,715 federal full-time equivalents (FTEs) to provide federal program and project management and appropriate oversight of the nuclear security enterprise responsible for managing and executing NNSA's Weapons Activities and Defense Nuclear Nonproliferation mission. NNSA supports the effort to formulate a comprehensive Government-wide Reform Plan to recruit, train, and maintain a workforce that efficiently deliver NNSA programs; and align the NNSA federal workforce to meet the needs of today and the future. As NNSA enters the next phase of the nuclear modernization efforts, a highly skilled federal workforce is necessary for appropriate oversight principally in Life Extension Programs (LEPs) and major project management. As of mid-March 2017, NNSA on-board staffing levels were 16.8 percent lower than FY 2010 FTE levels, while funding has increased 27.7 percent from FY 2010 Enacted levels to the FY 2017 request for Weapons Activities and Defense Nuclear Nonproliferation, primarily for the nuclear modernization program. Working with U.S. Office of Personnel Management (OPM) experts, NNSA is developing a Human Capital Management Plan (HCMP) that institutionalizes a consistent staffing analysis and career development methodology to support NNSA management responsibilities and prepare for an anticipated wave of retirements.

Highlights and Major Changes in the FY 2018 Budget

Weapons Activities

The major elements of the FY 2018 Request include maintaining the current Program of Record, such as:

- Accomplish all required stockpile maintenance activities to sustain the existing stockpile
- Execute the NWC-approved life extension programs (LEP), including the B61-12, with completion of a B61-12 first production unit no later than the second-quarter of FY 2020
- Complete production of the W76-1 warhead by FY 2019
- Complete the transition of W88 Alteration program activities from Phase 6.3 Development Engineering to Phase 6.4 Production Engineering in accordance with the integrated schedule to continue progress towards a first production unit in FY 2020
- Continue the W80-4 LEP, previously titled Cruise Missile Warhead LEP, with an adjusted FY 2025 first production unit in support of the Air Force Long Range Stand Off (LRSO) program
- Support the IW-1 LEP with first production unit in FY 2030
- Accelerate NNSA's Exascale program to maintain the performance of the nuclear weapons computer codes needed to ensure the safety, security, and reliability of the nuclear stockpile
- Continue investments in strategies, personnel, and technologies for modernization of science and manufacturing capabilities with a focus on reducing the risks in high explosives (HE), lithium and micro-electronics capabilities
- Execute a plutonium strategy that achieves a 30 pit per year (ppy) capacity by 2026
- Execute an uranium strategy to ensure the long term viability of uranium manufacturing capabilities and processes through a combination of risk reduction, recapitalization of existing infrastructure, and new facilities
- Execute RDT&E activities that support the LEP schedules through 2030 and sustain the associated workforce
- Maintain a risk-based security program and collaboration with the DOD, in support of nuclear security enterprise goals
- Continue to work toward transforming the information technology and cybersecurity environments to provide enhancement solutions
- Enhance facility maintenance activities and reinvestment projects to continue stabilization of deferred maintenance
- Continue the modernization of NNSA's infrastructure to reduce mission and safety risks and seek operational efficiencies by deactivating facilities that are no longer needed

Defense Nuclear Nonproliferation

The major elements of the FY 2018 - 2022 Request include:

- Convert and/or verify the shutdown of research reactors and isotope production facilities
- Identify and eliminate excess HEU and plutonium, including removing and/or disposing of 214 kilograms of material
- Pursue the dilute and dispose strategy to fulfill the United States' commitment to dispose of 34 metric tons of plutonium
- Support nuclear security best practices exchanges and/or training courses with more than 20 countries in Europe, Middle East, Africa, Asia, and Latin America
- Complete security upgrades at an additional 90 buildings with high-priority radioactive sources (45 domestic sites and 45 international sites)
- Deploy 20 mobile radiation detection systems and equip 16 new sites, along with associated training and maintenance support, to help counter the threat of illicit trafficking of special nuclear material; the bulk of these systems will be deployed in countries in Eastern Europe, the Middle East, and Africa
- Provide critical mission support to the IAEA, including strengthening the international nuclear safeguards system and supporting their expanding nuclear security activities
- Advance U.S. capabilities for early detection and discovery of foreign nuclear weapons development activities
- Increase U.S. capabilities to improve nuclear weapons and material security, including detecting special nuclear material movement and diversion, and monitoring warheads and safeguards
- Sustain and improve U.S. capabilities in nuclear explosion monitoring, including developing satellite payload activities that support treaty monitoring and military missions
- Recapitalize priority nuclear counterterrorism emergency response equipment including neutron multiplicity detectors, specialized search equipment, and contamination monitoring systems
- Build and sustain a highly secure field deployable incident response communications network for critical real-time information sharing between scientific experts, operational assets, and executive decision makers throughout the government in support of new Presidential policy requirements
- Maintain and strengthen the Department's capabilities to plan for and manage incidents and emergencies at its operating locations and contribute technical assistance capability to enhance Emergency Management and upgrade the Emergency Communications Network (ECN) Suite to state of art capabilities

Naval Reactors

The FY 2018 Budget Request continues NR's core objective of supporting the daily safe and reliable operation of the Nation's nuclear fleet (75 submarines, 11 aircraft carriers, and 4 research, development, and training platforms), constituting over 45 percent of the Navy's major combatants. The Request supports three major DOE initiatives: *Columbia*-class Reactor Systems Development, Land-based S8G Prototype Refueling Overhaul, and Spent Fuel Handling Recapitalization Project. Funding is also requested for the program direction account for NR federal salaries and expenses.

NNSA Federal Salaries and Expenses

The FY 2018 Budget Request builds upon on-going efforts to improve the effectiveness and efficiency of NNSA federal oversight and to meet current and future workforce needs. The Request provides support for 1,715 FTEs. Working with U.S. Office of Personnel Management (OPM) experts, NNSA is developing a Human Capital Management Plan (HCMP) that institutionalizes a consistent staffing analysis and career development methodology to support NNSA management responsibilities and prepare for an anticipated wave of retirements. Accession planning is critical since 44 percent of the current NNSA workforce will be eligible to retire by 2022.

<u>Entry Level Hires</u>: NNSA supports a variety of programs to help train and recruit the next generation of leaders in managing the nuclear stockpile, nonproliferation, nuclear security, and international security, such as the Presidential Management Fellow (PMF) program, NNSA Graduate Fellowship Program (NGFP), and Minority Serving Institutions Partnership Program (MSIPP). These programs foster the pipeline of qualified professionals who will sustain expertise through future employment in the nuclear security enterprise.

Department of Energy (DOE) Working Capital Fund (WCF) Support

In the FY 2018 Budget Request, NNSA's projected support to the DOE Working Capital Fund (WCF) is $87,553,000 of which $44,340,000 will be paid out of FSE; $33,389,000 out of WA; $5,892,000 out of DNN; and $3,932,000 out of NR. This funding covers selected shared enterprise activities including managing enterprise-wide systems and data, telecommunications and supporting the integrated acquisition environment.

Legacy Contractor Pensions

NNSA requests $273,000,000 in FY 2018 for Legacy Contractor Pensions split between Weapons Activities and Defense Nuclear Nonproliferation, $105,504,000 less than the FY 2016 Enacted level. This funding provides the annual NNSA share of the DOE's reimbursement of payments made to the University of California (UC) Retirement Plan (UCRP) for former UC employees and annuitants who worked at the Lawrence Livermore National Lab (LLNL) and Los Alamos National Lab (LANL). The UCRP benefit for these individuals is a legacy cost and DOE's annual payment to the UC is required by contract. The amount of the annual payment is based on the actuarial valuation report and is covered by the terms described in the contracts. The UC Board of Regents voted in November 2015 to make more conservative assumptions on mortality and interest rates, increasing NNSA's costs for FY 2018, which is covered in the request.

Crosscutting Programs

The FY 2018 Budget Request continues crosscutting programs which coordinate across the Department and seeks to tap DOE's full capability to effectively and efficiently address the United States' energy, environmental, and national security challenges. These crosscutting initiatives (which are listed below) are discussed further within the Programs in which the crosscuts are funded.

Cybersecurity Crosscut

DOE is engaged in two categories of cyber-related activities: protecting the DOE enterprise from a range of cyber threats that can adversely impact mission capabilities, and improving cybersecurity and grid resilience in the energy sector. The cybersecurity crosscut supports central coordination of the strategic and operational aspects of cybersecurity and facilitates cooperative efforts such as the Integrated Joint Cybersecurity Coordination Center (iJC3) for incident response and the implementation of Department-wide Identity, Credentials, and Access Management (ICAM).

Exascale Computing

Exascale systems are needed to support areas of research that are critical to national security objectives as well as applied research advances in areas such as earth-systems models, combustion systems, and nuclear reactor design that are not within the capacities of today's systems. Exacale systems' computational power are needed for increasing capable data-analytic and data-intense applications across the entire Federal complex. Exascale is a component of long-term collaboration between the Office of Science's Advanced Scientific Computing Research program and NNSA's Advanced Simulation and Computing (ASC) program. Included in NNSA's Request is $183,000,000 in FY 2018 for activities and research leading to deployment of exascale capability for national security applications in the early 2020s.

Top 10 Property Leases at NNSA

Rebuilding the nuclear security enterprise infrastructure requires both federal funding and public-private parternships. NNSA has leveraged leasing arrangements, when in the government's best interest, to take advantage of using private sector construction expertise and economies-of-scale to quickly and cost-effectively acquire modern, efficient facilities for public use. The top ten leases for NNSA are included below with the property name, annual rent and usable square feet as well as the funding mechanism of direct or indirect is included.

Site	Property Name	Annual Rent	Usable Square Feet	Funding Source
Kansas City National Security Campus	National Security Campus	$51,021,095	977,036	Direct
Kansas City National Security Campus	National Security Manufacturing Cnt	$13,814,764	260,906	Direct
Y-12 National Security Complex [a]	Jack Case Office Building	$8,798,764	288,286	Indirect
Pantex Plant	Administrative Support Complex	$6,187,634	342,800	Direct
Sandia National Laboratories	Innovation Parkway Office Center	$3,759,000	118,730	Indirect
Nevada National Security Site - Santa Barbara	Special Technologies Laboratory	$2,728,987	70,695	Indirect
Y-12 National Security Complex	New Hope Center [a]	$2,924,187	96,431	Indirect
Sandia National Laboratories	Center for Global Security & Coop	$1,635,117	45,617	Indirect
Nevada National Security Site - Los Alamos	Specialized Lab and Admin Space	$1,257,044	35,890	Indirect
Nevada National Security Site	Southern Nevada Science Center II	$1,165,505	32,535	Direct

[a] Does not include the State of Tennessee tax assessment for leased property.

Indirect Costs and Other Items of Interest[a]

General Plant Projects (GPP)

Pursuant to Section 3121 of the Ike Skelton National Defense Authorization Act for FY 2011 (P.L. 111-383), notification is being provided for general plant projects with a total estimated cost of more than $5 million planned for execution in FY 2017 and FY 2018.

FY 2017 General Plant Projects

Weapons Activities - Lawrence Livermore National Laboratory

Project Title	Program	TEC	Project Description	FY 2016 Enacted	FY 2016 Current	FY 2017 Annualized CR	FY 2018 Request	Outyears	Construction Design Estimate
B654 Livermore Computing Center	Advanced Simulation and Computing	9,875,000	New computing center	9,875,000	9,875,000	0	0	0	950,000
B-453 Power Modernization	Advanced Simulation and Computing	5,500,000	Install 7.5MW of electrical switchgear	2,000,000	2,000,000	3,500,000	0	0	400,000
B-453 Sierra Site Prep	Advanced Simulation and Computing	8,000,000	Install electrical, mechanical and control systems for new 150PF HPC system	0	0	5,000,000	3,000,000	0	800,000

Naval Reactors - Naval Reactors Facility, Idaho

Project Title	Program	TEC	Project Description	FY 2016 Enacted	FY 2016 Current	FY 2017 Annualized CR	FY 2018 Request	Outyears	Construction Design Estimate
NRF Vehicle Barrier System	Naval Reactors	6,000,000	VBS at NRF	0	0	6,000,000	0	0	0

[a] Due to the nature of reporting requirements of the Infrastructure and Operations program, FY 2017 Enacted was included to accurately list planned projects for Notification.

Weapons Activities – Y-12 National Security Complex

Project Title	Program	TEC	Project Description	FY 2016 Enacted	FY 2016 Current	FY 2017 Annualized CR	FY 2018 Request	Outyears	Construction Design Estimate
Bldg. 92042E Dry Room Control Upgrades	Directed Stockpile Work	8,139,000	The scope of this project is to upgrade the Dry Room as necessary to extend and maintain the Y-12 Dry Room. The new equipment, controls, monitoring systems and software will be off-the-shelf products. Upgrade the existing pneumatic control valves & dampers, Demolition/modification the cabinets. This project will replace all current equip. required to achieve, control and maintain the Dry Room.	0	0	805,000	3,758,000	3,576,000	500,000

Weapons Activities – Nevada National Security Site

Project Title	Program	TEC	Project Description	FY 2016 Enacted	FY 2016 Current	FY 2017 Enacted	FY 2018 Request	Outyears	Construction Design Estimate
Water/Wastewater Systems - CP Hill Water Line Replacement	Recapitalization: Infrastructure and Safety	7,000,000	Project reduces significant mission risk; current water lines are severely degraded and approximately 4000 feet must be replaced. Failure of the water lines would result in significant operating limitations on DAF, JASPER, and U1a.	0	0	7,000,000	0	0	500,000

Weapons Activities – Y-12 National Security Complex

Project Title	Program	TEC	Project Description	FY 2016 Enacted	FY 2016 Current	FY 2017 Enacted	FY 2018 Request	Outyears	Construction Design Estimate
Criticality Accident Alarm System Replacement	Recapitalization: Infrastructure and Safety	6,700,000	Replace, upgrade and install the processing/alarm cabinet and Criticality Accident Alarm System (CAAS) detectors in Building 9204-2E.	0	0	6,700,000	0	0	750,000
3rd St 13.8kV Electrical Power Distribution Installation	Recapitalization: Infrastructure and Safety	5,425,000	The 3rd Street 13.8 kV Power Line Installation Project will install the majority of the 13.8kV power distribution systems (poles, guy wires, distribution lines) required to connect the new substation to the two existing distribution busses inside the Y-12 complex while the new substation is being designed and constructed.	0	0	5,425,000	0	0	585,000

General Plant Projects (GPP)

Pursuant to Section 3121 of the Ike Skelton National Defense Authorization Act for FY 2011 (P.L. 111-383), notification is being provided for general plant projects with a total estimated cost of more than $5 million planned for execution in FY 2018.

FY 2018 General Plant Projects

Weapons Activities - Pantex Plant

Project Title	Program	TEC	Project Description	FY 2016 Enacted	FY 2016 Current	FY 2017 Annualized CR	FY 2018 Request	Outyears	Construction Design Estimate
12-64 Bays 6,11,12 &15 Replacement Facilities	Directed Stockpile Work	5,283	This project will reconfigure Bays 6, 11, 12 and 15 to support stage right of 2030 or 2040 pallets. Current operations 11, 12 and 15 will need to be moved out so stage right can be moved in; the locations to support these moves have not been identified and is a risk to the project. Bay 6 is currently staging and will temporarily house a weigh and leak station before returning to staging.	0	0	0	708	4,575	1,290

Weapons Activities – Pantex Plant

Project Title	Program	TEC	Project Description	FY 2016 Enacted	FY 2016 Current	FY 2017 Enacted	FY 2018 Request	Outyears	Construction Design Estimate
Building 12-44 Equipment Room Expansion	Recapitalization: Infrastructure and Safety	9,200,000	This project will provide additional equipment room space for Building 12-44 and segregate the building's mechanical and electrical equipment. Aging Electrical Distribution System (EDS) components, Public Address (PA) system Uninterruptible Power Supply (UPS), and the facility UPS system (2 UPS units) will be replaced. A backup generator will be installed. Adequate Heating, Ventilation, and Air Conditioning (HVAC) and fire protection will be provided. Un-needed electrical will be removed from the existing equipment room.	0	0	0	9,200,000	0	1,000,000

Weapons Activities – Lawrence Livermore National Laboratory

Project Title	Program	TEC	Project Description	FY 2016 Enacted	FY 2016 Current	FY 2017 Enacted	FY 2018 Request	Outyears	Construction Design Estimate
Site 300 Electrical Utility Display Upgrade	Recapitalization: Infrastructure and Safety	6,750,000	Site 300 is served by one electric utility power source which failed recently. To mitigate against future outages, this project will provide Site 300 with a second power, significantly improving electric utility system reliability during both scheduled and unscheduled electric utility source power outages.	0	0	0	6,750,000	0	600,000
New AME Polymers Capabilities Facility	Recapitalization: Infrastructure and Safety	9,900,000	B231 vacating plan is to relocate capabilities by repurposing existing facilities and constructing new laboratory facilities. In total, the capabilities will be housed in enduring facilities with 40% less sq footage than now, due to major consolidation. This specific project is new GPP construction to house the B231 polymer capability.	0	0	0	9,900,000	0	900,000

Weapons Activities – Los Alamos National Laboratory

Project Title	Program	TEC	Project Description	FY 2016 Enacted	FY 2016 Current	FY 2017 Enacted	FY 2018 Request	Outyears	Construction Design Estimate
PF-4 Fire Wall Upgrades	Recapitalization: Infrastructure and Safety	7,000,000	LANL PF-4 Fire Wall Upgrades supports the expansion of programmatic operations in PF-4 for Directed Stockpile Work (DSW), Life Extension Programs (LEP's) and Plutonium Sustainment. The fire wall modifications will segregate the first floor of PF-4 into four distinct fire areas in support of programmatic equipment and process expansion with concurrent maximum possible fire loss increases.	0	0	0	7,000,000	0	2,100,000

Weapons Activities – Nevada National Security Site

Project Title	Program	TEC	Project Description	FY 2016 Enacted	FY 2016 Current	FY 2017 Enacted	FY 2018 Request	Outyears	Construction Design Estimate
New Mercury Consolidated Operations Complex Building 1 (23-460)	Recapitalization: Infrastructure and Safety	9,000,000	This project provides new administrative building space to replace aging and failing infrastructure at the NNSS Mercury complex.	0	0	0	9,000,000	0	1,000,000
DAF Electrical Substations Upgrade	Recapitalization: Infrastructure and Safety	5,500,000	The scope of this project involves minor upgrades to substation 06-06; major upgrades to substation 06-15 (breakers, transformer, new relaying, etc.); and vault MH-A (automatic pad mounted housing switch). These upgrades will fully automate the monitoring, control, and switching of incoming power to the DAF from power dispatch through the existing supervisory control and data acquisition (SCADA) system and improve the overall reliability of commercial electrical power to the facility.	0	0	0	5,500,000	0	800,000

Weapons Activities – Sandia National Laboratories

Project Title	Program	TEC	Project Description	FY 2016 Enacted	FY 2016 Current	FY 2017 Enacted	FY 2018 Request	Outyears	Construction Design Estimate
SNL/CA Sanitary Sewer Replacements	Recapitalization: Infrastructure and Safety	7,000,000	This project will replace the aged piping, abate asbestos containing transite piping, and reconfigure trunk lines to provide proper flows.	0	0	0	7,000,000	0	500,000

Weapons Activities – Y-12 National Security Complex

Project Title	Program	TEC	Project Description	FY 2016 Enacted	FY 2016 Current	FY 2017 Enacted	FY 2018 Request	Outyears	Construction Design Estimate
Bear Creek Road 13.8kV Electrical Power Distribution Installation	Recapitalization: Infrastructure and Safety	8,600,000	The Bear Creek Road 13.8 kV Power Line Project will install the majority of the 13.8kV power distribution systems (poles, guy wires, transmission lines) required to connect the new substation to the two existing distribution busses inside the Y-12 complex while the new substation is being designed and constructed.	0	0	0	8,600,000	0	780,000

Naval Reactors, Naval Reactors Facility, Idaho

Project Title	Program	TEC	Project Description	FY 2016 Enacted	FY 2016 Current	FY 2017 Enacted	FY 2018 Request	Outyears	Construction Design Estimate
NRF Security Upgrades	Naval Reactors	8,000,000	NRF Security Upgrades	0	0	0	300,000	7,700,000	300,000

50 US Code 2746 requires that if the total estimated cost for construction design in connection with any construction project exceeds $2,000,000, funds for that design must be specifically authorized by law. NNSA requests Congressional Authorization for 2018 General Plant Projects exceeding the $2,000,000 design threshold for the following project**:**

Weapons Activities – Los Alamos National Laboratory

Project Title	Program	TEC	Project Description	FY 2016 Enacted	FY 2016 Current	FY 2017 Enacted	FY 2018 Request	Outyears	Construction Design Estimate
PF-4 Fire Wall Upgrades	Recapitalization: Infrastructure and Safety	7,000,000	LANL PF-4 Fire Wall Upgrades supports the expansion of programmatic operations in PF-4 for Directed Stockpile Work (DSW), Life Extension Programs (LEP's) and Plutonium Sustainment. The fire wall modifications will segregate the first floor of PF-4 into four distinct fire areas in support of programmatic equipment and process expansion with concurrent maximum possible fire loss increases.	0	0	0	7,000,000	0	2,100,000

Institutional General Plant Projects for NNSA

FY 2018

Los Alamos National Laboratory

Project Title	Program	TEC	Project Description	FY 2016 Enacted	FY 2016 Current	FY 2017 Enacted	FY 2018 Request	Outyears	Construction Design Estimate
New SCIF Building	Institutional	9,500,000	Utilize modular construction methodology to procure and erect a new 12,000 sq. ft. facility for SCIF operations. LANL Long range infrastructure plan has appropriate sq. ft. offset already planned.	0	0	0	500,000	9,000,000	500,000
New Office Building	Institutional	9,500,000	Utilize modular construction methodology to procure and erect a new 15,000 sq. ft. office facility. LANL Long range infrastructure plan has appropriate sq. ft. offset already planned.	0	0	0	500,000	9,000,000	500,000
TA-50 Building 37 Upgrade for Increased Occupancy	Institutional	8,000,000	Demo existing building electrical & mechanical systems to upgrade interior for increased office occupancy within existing space. This project will include upgrades to building HVAC, fire protection, electrical distribution, restrooms, and interior partition walls.	0	0	0	1,000,000	7,000,000	600,000
TA-53 Building 19 Upgrade for Physics Division Relocation	Institutional	8,500,000	Demo existing laboratories, upgrade building HVAC, fire protection, electrical distribution, and	0	0	0	600,000	7,900,000	600,000

Project Title	Program	TEC	Project Description	FY 2016 Enacted	FY 2016 Current	FY 2017 Enacted	FY 2018 Request	Outyears	Construction Design Estimate
			installation of laboratory equipment.						
TA-35 Building 189 Renovation	Institutional	8,000,000	Renovate TA-35 building 189 to upgrade building HVAC, fire protection, electrical distribution for revised mission utilization.	0	0	0	600,000	7,400,000	600,000

Sandia National Laboratories

Project Title	Program	TEC	Project Description	FY 2016 Enacted	FY 2016 Current	FY 2017 Request	FY 2018 Request	Outyears	Construction Design Estimate
New Employee Integration Center (ABQ)	Institutional	9,700,000	Design and construct a new facility for students and un-cleared personnel pending their clearance. This project will reduce Deferred Maintenance by ~$437K, with removal of trailers and replaces and offsets 11.8K gross square feet of real property.	0	0	0	4,000,000	5,700,000	750,000
ABQ Parking Structure	Institutional	9,500,000	Provide design and construction to build a new parking structure in the NW quadrant of TA-I. The parking structure will provide 400 – 500 parking spaces. Site selection will consider vehicular traffic, pedestrian flow, and controls into major roadways into Tech Area I, future building locations, and current and future parking areas. The project will also include parking lot lighting, drainage, ventilation, bicycle and pedestrian circulation, and Personal Electrical Vehicle (PEV) charging stations.	0	0	0	5,500,000	4,000,000	750,000

Project Title	Program	TEC	Project Description	FY 2016 Enacted	FY 2016 Current	FY 2017 Request	FY 2018 Request	Outyears	Construction Design Estimate
ABQ Generic Modular Lab	Institutional	9,700,000	This space provides temporary, general, generic lab space for providing flexibility in managing Sandia's lab needs. Constructing a modular laboratory space will allow for near-term mission use, and vacating of existing lab space for renovation or demolition.	0	0	0	4,000,000	5,700,000	750,000

Lawrence Livermore National Laboratories

Project Title	Program	TEC	Project Description	FY 2016 Enacted	FY 2016 Current	FY 2017 Request	FY 2018 Request	Outyears	Construction Design Estimate
B490 Secure Laser Labs	Institutional	7,176,000	Develop and secure Q/L clearance laser lab space - conceptual design and some build out includes class 10,000 cleanrooms with the required flexibility in its utility design to accommodate a variety of users.	0	1,026,000	5,600,000	550,000	0	320,000
New generic office building	Institutional	9,800,000	Construct an approximately 20,000 SF office building to allow for migration out of substandard space and to create quality new office space for growing mission.	0	0	0	800,000	9,000,000	800,000
New AME office building	Institutional	9,800,000	Construct an approximately 20,000 SF office building to allow for migration out of substandard space and to create quality new office space for growing mission.	0	0	0	500,000	9,300,000	900,000
B341 Facility upgrade	Institutional	5,100,000	Modernize B341 for future multipurpose lab use including overhauling building electrical and plumbing system, removing legacy components, and improving room configurations.	0	0	0	1,500,000	3,600,000	500,000

Major Items of Equipment

(dollars in thousands)

Project Title	Program	TEC	Project Description	FY 2016 Enacted	FY 2016 Current	FY 2017 Annualized CR	FY 2018 Request	Outyears
Coordinate Measurement Machine #1, LANL	Directed Stockpile Work	30,033	CMM #1 is a precision measuring devise used to inspect pit components against strict war reserve quality tolerances. The CMM must be housed in a vibrationally isolated, temperature controlled plutonium glove box	5,740	5,740	8,602	5,000	1,500
Coordinate Measurement Machine #2, LANL	Directed Stockpile Work	25,439	CMM #2 is a precision measuring devise used to inspect pit components against strict war reserve quality tolerances. The CMM must be housed in a vibrationally isolated, temperature controlled plutonium glove box	3,989	3,989	7,113	8,900	2,843
CNC Waist Banding Lathe #2, LANL	Directed Stockpile Work	5,225	Computer Numerical Controlled (CNC) Lathe is used for waistbaning operations, parting of plutonium assemblies, and preparations of samples	1,446	1,446	1,485	500	0
CNC Waist Banding Lathe #2	Directed Stockpile Work	5,164	Computer Numerical Controlled (CNC) Lathe is used for waistbaning operations, parting of plutonium assemblies, and preparations of samples.	0	0	400	2,264	2,500
CoLOSSIS II	Directed Stockpile Work	13,292	Installation of CoLOSSIS II radiography equipment for needed increase in capacity. Funding updated to reflect LLNL support for CoLOSSIS II start-up activities and delay in completion until FY18	6,033	6,033	3,074	600	0

(dollars in thousands)

Project Title	Program	TEC	Project Description	FY 2016 Enacted	FY 2016 Current	FY 2017 Annualized CR	FY 2018 Request	Outyears
Molecular Beam Epitaxy System	Directed Stockpile Work	10,170	Single-wafer 4-6in III-V tool will become the dedicated epitaxy tool for HBT-based NW products in the 2017-2040 timeframe. Present research system was first installed in the CSRL in 1994, then moved to MESA in 2006.	0	0	0	10,170	0
Trinity (ATS-1) system, LANL	Advanced Simulation and Computing	170,000	Acquisition of Trinity (ATS-1) system	47,600	47,600	15,106	7,426	5,132
Crossroads (ATS-3) system, LANL	Advanced Simulation and Computing	170,000	Acquisition of Crossroads (ATS-3) system	0	0	9,000	13,400	147,600
Sierra (ATS-2) System, LLNL	Advanced Manufacturing Development	161,000	Acquisition of Sierra (ATS-2) system	21,900	21,900	56,000	46,200	0
Calciner, Y-12	Advanced Manufacturing Development	36,600	Calciner project will provide the capability to more efficiently convert EU solutions to a solid oxide.	7,100	7,100	3,500	7,750	18,250
Machine Chip Processing Furnace 1, Y-12	Advanced Manufacturing Development	9,750	Deploy chip cleaning and handling operations into Bldg 9215 to safely process machine chips into recoverable form during UPF transition.	740	740	4,500	4,510	0
Electrofiners, Y-12	AMD - Advanced Manufacturing Development	74,219	Electro refining will provide the capability to more efficiently purify EU metal.	9,600	9,600	20,000	18,250	26,369

(dollars in thousands)

Project Title	Program	TEC	Project Description	FY 2016 Enacted	FY 2016 Current	FY 2017 Annualized CR	FY 2018 Request	Outyears
Reestablish HE Development Machining Capabilities, PX	Recapitalization: Capability Based Investments	6,780	Re-establish high explosive machining capabilities and pellet pressing in an existing facility to increase the capability and capacity of HE operations in order to meet projected workload	0	0	3,150	3,630	0
Replace Lujan Target, LANL	Recapitalization: Capability Based Investments	8,000	Replacement of the Lujan target to support the understanding of initial conditions for boost, criticality, yield, and fission in nuclear physics measurements	0	0	0	400	7,600
Lithium Salt Crusher/Grinder, Y-12	Recapitalization: Capability Based Investments	8,860	Procure and install a new crusher/grinder system (crusher, pulverizer, glovebox, etc.) in an existing facility to support lithium salt part production	0	0	0	400	8,460
Single Ion Implanter, SNL	Recapitalization: Capability Based Investments	5,000	The ion implantation system injects selected dopant atoms uniformly across a substrate to a prescribed depth at a desired concentration. Ion implantation is a process technology in which ions of dopant chemicals (boron, arsenic, etc.) are accelerated in intense electrical fields to penetrate the surface of a wafer, thus changing the electrical characteristics of the material.					
High Performance Computer (FY 2018 Buy)	Naval Reactors	5,500	Supports existing research and development workload by reducing labor costs and increasing modeling and simulation capabilities to replace the construction of physical tests.	0	0	0	5,500	0
Land-Based Prototype Instrumentation and Control	Naval Reactors	17,900	Design, build, and testing of Generic Instrumentation and Control for the S8G Prototype Refueling Overhaul	1,830	1,830	200	790	0

Site Estimates

(Dollars in Thousands)

Site	FY 2016 Enacted	FY 2017 CR Annualized*	FY 2018 FSE	FY 2018 WA	FY 2018 NN	FY 2018 NR	FY 2018 Total
Argonne National Laboratory	49,706	45,991	0	300	44,849	0	45,149
Bechtel Marine Propulsion Corporation	1,450	432	0	330	0	0	330
Bettis Atomic Power Laboratory	485,696	521,874	0	0	0	556,205	556,205
Brookhaven National Laboratory	11,526	10,105	0	275	9,998	0	10,273
Chicago Operations Office	290	1,500	0	0	0	0	0
Consolidated Business Center	470	530	0	530	0	0	530
General Atomics	24,000	24,420	0	24,125	0	0	24,125
Headquarters	1,236,720	1,454,923	303,603	1,060,855	144,620	137,456	1,646,534
Idaho National Laboratory	277,270	226,880	0	2,793	71,767	163,438	237,998
Kansas City Plant	615,637	536,778	0	641,286	22,404	0	663,690
Kansas City Site Office	6,700	6,987	7,447	0	0	0	7,447
Knolls Atomic Power Laboratory	596,959	574,568	0	0	0	601,952	601,952
Lawrence Berkeley National Laboratory	11,502	9,509	0	0	10,233	0	10,233
Lawrence Livermore National Laboratory	1,197,543	1,207,618	0	1,230,447	117,299	0	1,347,746
Livermore Site Office	18,062	16,819	18,808	0	0	0	18,808
Los Alamos National Laboratory	1,915,485	1,842,421	0	1,728,265	260,284	0	1,988,549
Los Alamos Site Office	14,862	14,925	16,185	0	0	0	16,185
National Energy Technology Laboratory	9,857	21,027	0	17,636	0	0	17,636
National Research Laboratory	0	350	0	350	0	0	350
Naval Reactors Laboratory Field Office	18,950	19,910	0	670	0	20,700	21,370
Naval Research Laboratory	6,450	10,860	0	11,050	0	0	11,050
Nevada National Security Site	376,154	335,055	0	288,993	82,202	0	371,195
Nevada Site Office	89,070	94,773	17,772	77,518	474	0	95,764
New Brunswick Laboratory	272	380	0	0	227	0	227
NNSA ABQ Complex (all other sites)	672,406	474,969	0	589,331	144,898	0	734,229
NNSA Production Site Office	28,982	35,459	26,365	7,500	25,768	0	59,633
Oak Ridge Institute for Science and Engineering	10,807	3,744	0	200	3,580	0	3,780
Oak Ridge National Laboratory	117,373	127,876	0	48,074	69,640	0	117,714
Office of Science and Technical Information	429	462	0	233	32	0	265
Pacific Northwest National Laboratory	319,061	268,257	0	37,779	197,587	0	235,366
Pantex Plant	661,407	712,584	0	746,170	2,651	0	748,821
Princeton	0	105	0	0	113	0	113
Richland Operations Office	1,425	1,508	0	0	1,743	0	1,743
Sandia National Laboratories	1,753,407	1,733,484	0	1,775,504	208,246	0	1,983,750
Sandia Site Office	20,869	22,429	22,886	0	0	0	22,886
Savannah River Operations Office	334,006	327,340	0	0	263,119	0	263,119
Savannah River Site	306,311	300,732	0	301,655	97,877	0	399,532
Savannah River Site Office	4,883	6,512	5,529	0	0	0	5,529
Stanford Linear Accelerator Center	0	90	0	90	0	0	90
University of Rochester/LLE	64,264	62,800	0	66,852	0	0	66,852
Westinghouse TRU Solutions (WIPP)	51	20	0	0	23	0	23
Y-12 National Security Complex	1,307,676	1,507,556	0	1,580,533	62,676	0	1,643,209
Adjustments of Prior Year Balances	-41,476	-61,000	0		-49,000	0	-49,000
Grand Total	12,526,512	12,503,562	418,595	10,239,344	1,793,310	1,479,751	13,931,000

* The FY 2017 Annualized CR amounts reflect the P.L. 114-254 continuing resolution level annualized to a full year. These amounts are shown only at the congressional control level and above, below that level, a dash (-) is shown.

NDAA 2017 Requirement

Section 3132—Annual Report on Service Support Contracts of the National Nuclear Security Administration. Requires the Administrator to submit, along with NNSA's annual report on service support contracts, information regarding the cost of service support contracts and identification of the program or program direction accounts that support each such contract.

For this 2017 report, see the following table, which includes information for the annual report along with the cost of the support service contracts and identification of program or program direction accounts.

NDAA FY 2016 Requirement

"…require with each budget submission the NNSA provide a report that provides the number of full time equivalent employees under section 3241A of the NNSA Act (50 U.S.C. 2441a), the number of service support contracts and whether the contracts are funded with program funds, the number of full time equivalent employees under each contract and the number in each contract that have been employed for more than 2 years."

Support Service Contracts

SEC. 3138. ANNUAL REPORT ON NUMBER OF FULL-TIME EQUIVALENT EMPLOYEES AND CONTRACTOR EMPLOYEES. Section 3241A of the National Nuclear Security Administration Act (50 U.S.C. 2441a) is amended by adding at the end the following new subsection:

''(f) ANNUAL REPORT.—The Administrator shall include in the budget justification materials submitted to Congress in support of the budget of the Administration for each fiscal year (as submitted with the budget of the President under section 1105(a) of title 31, United States Code) a report containing the following information as of the date of the report:

''(1) The number of full-time equivalent employees of the Office of the Administrator, as counted under subsection (a).

''(2) The number of service support contracts of the Administration and whether such contracts are funded using program or program direction funds.

''(3) The number of full-time equivalent contractor employees working under each contract identified under paragraph (2).

''(4) The number of full-time equivalent contractor employees described in paragraph (3) that have been employed under such a contract for a period greater than two years.''.

The FSE chapter of the budget provides information for (f)(1). The following table provides information required in paragraphs (f)(2) and (f)(3). NNSA does not have information to address paragraph (f)(4). NNSA is not privy to employment information for contractors performing under support service contracts. As a result, we cannot provide details for subsection paragraph (f)(4) which falls under the responsibility of each individual contractor employer when determining who will perform the scope of work required by the terms and conditions of each contract. The typical length of a support service contracts is 5 years. Recurring follow-on contracts may or may not employ the same contractor employees; however, it is the responsibility of the contractor to provide appropriate staff and exercise its best efforts and cooperation to effect an orderly and efficient transition to a successor.

For this Annual Service Support report contracts were determined using definitions in the OMB Memorandum November 2011 "Management Support Services", the Annual Service Contract Inventory: Special Interest Functions, the DOE Acquisition Guide, and expanded to include any other support services not otherwise captured that are funded with "Federal Salaries and Expenses." The following services were excluded: Management and Operating contracts, contracts for housekeeping, custodial, physical security, and facilities maintenance.

Vendor Name	Order Number	Fund Description	Obligations to Date	Maximum Value (Ultimate Value incl. options)	Total FTEs
TECHSOURCE, INC.	BP0002826	Both Program & FSE	$4,895,619.25	$5,249,543.97	4
Vector Resource, Inc	BP0003117	FSE	$1,874,252.24	$3,357,626.00	2.5
TECHSOURCE, INC.	BP0003135	Program	$4,108,154.55	$4,110,154.55	3
CORPORATE ALLOCATION SVCS, INC.	BP0003154	Program	$441,133.20	$445,301.80	1
TECHSOURCE, INC.	BP0003155	Program	$2,356,594.40	$2,366,864.82	3
STRATA G, LLC	BP0003210	Program	$2,868,000.00	$9,739,060.00	2.5
TECHSOURCE, INC.	BP0003227	Program	$3,643,285.78	$4,382,181.53	3
TECHSOURCE, INC.	BP0003257	Program	$10,130,173.54	$10,743,987.83	9
MELE ASSOCIATES, INC.	BP0003261	Program	$3,600,895.41	$3,600,895.41	4.5
CORPORATE ALLOCATION SVCS, INC.	BP0003315	Program	$1,087,622.33	$1,548,166.30	0.5
CORPORATE ALLOCATION SVCS, INC.	BP0003332	Program	$701,143.68	$765,034.06	2
MELE ASSOCIATES, INC.	BP0003336	Program	$7,966,591.36	$10,830,416.20	17.5
LINK TECHNOLOGIES INC	BP0003340	Program	$5,470,000.00	$5,791,767.00	14
TECHSOURCE, INC.	BP0003347	Program	$4,306,284.92	$6,128,363.64	4
MELE ASSOCIATES, INC.	BP0003375	Program	$20,336,827.08	$32,407,341.09	13
TECHSOURCE, INC.	BP0003473	Program	$5,025,261.06	$5,840,823.11	9
CORPORATE ALLOCATION SVCS, INC.	BP0003654	Program	$4,400,000.00	$7,630,186.95	8.5
Allegheny Science & Technology Corporation	BP0003722	Program	$2,155,238.40	$5,947,811.04	5
LONGENECKER & ASSOCIATES, INC.	BP0003739	Program	$1,508,055.69	$4,766,388.19	3.5
TECHSOURCE, INC.	BP0003800	Both Program & FSE	$4,407,571.84	$6,414,417.01	11.6
MELE ASSOCIATES, INC.	BP0003826	Program	$17,324,162.24	$46,267,313.84	16

Vendor Name	Order Number	Fund Description	Obligations to Date	Maximum Value (Ultimate Value incl. options)	Total FTEs
TECHSOURCE, INC.	BP0004171	FSE	$1,741,926.94	$2,745,493.96	3
TECHSOURCE, INC.	BP0004181	Program	$3,391,923.30	$12,734,986.37	21
TECHSOURCE, INC.	BP0004432	Program	$4,250,000.00	$18,987,108.66	16.5
MELE ASSOCIATES, INC.	BP0004561	Program	$4,707,133.54	$14,560,733.38	9.5
CRITERION SYSTEMS, INC.	BP0005221	Program	$1,645,443.00	$9,443,316.00	9
COHNREZNICK LLP	BP0005348	Program	$151,375.00	$151,375.00	1.6
ONPOINT CONSULTING, INC.	DT0001389	Program	$96,365,263.96	$105,357,344.00	18
NAVARRO RESEARCH AND ENGINEERING, INC.	DT0002471	Program	$21,770,594.96	$21,770,594.96	22
J.G. MANAGEMENT SYSTEMS, INC.	DT0002733	Both Program & FSE	$2,111,491.97	$2,172,083.34	4
DELTA RESEARCH ASSOCIATES, INC	DT0002831	FSE	$511,037.43	$521,462.00	1
GENQUEST, INC.	DT0003272	FSE	$87,830.69	$124,416.00	3
GENQUEST, INC.	DT0003312	FSE	$670,052.99	$670,052.99	2
GENQUEST, INC.	DT0003548	Program	$752,582.00	$756,050.00	1
EXELIS INC.	DT0003791	Program	$1,753,237.62	$1,893,044.00	1.5
TIME SOLUTIONS, LLC	DT0004308	FSE	$2,121,723.38	$2,479,243.96	3
ACTIONET, INC.	DT0005199	Program	$6,596,905.59	$9,633,849.53	3
JDG ASSOCIATES, INC.	DT0005869	FSE	$208,800.00	$338,800.00	1
Intuitive Information Systems Technologies, LLC	DT0006552	Program	$2,085,474.00	$3,028,817.86	4.5
TECHSOURCE, INC.	DT0006641	Program	$931,042.39	$1,041,503.09	2
MIRACORP, INC.	DT0007712	FSE	$256,960.13	$256,960.13	1
CE2 CORPORATION, INC.	DT0007776	FSE	$1,424,505.00	$2,978,811.99	5
CE2 CORPORATION, INC.	DT0007798	FSE	$1,682,133.06	$2,057,337.90	6.5
CE2 CORPORATION, INC.	DT0007822	FSE	$713,238.92	$776,771.68	2
LONGENECKER & ASSOCIATES, INC.	DT0007874	FSE	$386,920.48	$847,456.32	1

Vendor Name	Order Number	Fund Description	Obligations to Date	Maximum Value (Ultimate Value incl. options)	Total FTEs
Parsons Government Services Inc.	DT0007897	Both Program & FSE	$2,909,714.00	$2,909,714.00	0.5
Parsons Government Services Inc.	DT0007936	Both Program & FSE	$2,423,380.13	$2,423,380.13	3
SALMON GROUP, INC.	DT0008258	Both Program & FSE	$2,331,268.64	$2,378,000.00	8
Vector Resource, Inc	DT0008266	Both Program & FSE	$4,959,868.00	$4,959,868.00	5
GENQUEST, INC.	DT0008485	Program	$218,000.00	$338,786.76	1
SALMON GROUP, INC.	DT0008609	FSE	$1,392,000.00	$1,392,000.00	6
Parsons Government Services Inc.	DT0008737	FSE	$4,344,644.84	$7,122,121.70	5
INNOVATIVE REASONING LLC	DT0008760	Program	$11,702,631.58	$33,386,921.31	73
LONGENECKER & ASSOCIATES, INC.	DT0008761	Program	$3,349,427.00	$9,872,924.00	21
CE2 CORPORATION, INC.	DT0008938	FSE	$3,427,324.00	$10,786,473.11	16
Parsons Government Services Inc.	DT0009032	Program	$1,382,522.00	$1,382,522.00	2
J.G. MANAGEMENT SYSTEMS, INC.	DT0009287	Program	$202,563.40	$405,126.84	1
J.G. MANAGEMENT SYSTEMS, INC.	DT0009288	Program	$291,011.75	$582,023.49	1
Parsons Government Services Inc.	DT0009412	Program	$878,631.34	$1,110,631.34	4
CE2 CORPORATION, INC.	DT0009471	FSE	$769,742.00	$3,076,651.36	4
CHENEGA GOVERNMENT CONSULTING, LLC	DT0009528	Program	$2,419,961.00	$2,419,961.00	7
LONGENECKER & ASSOCIATES, INC.	DT0009564	FSE	$741,165.00	$2,951,000.30	5.5
Parsons Government Services Inc.	DT0009568	FSE	$1,192,293.00	$1,192,293.00	2

Vendor Name	Order Number	Fund Description	Obligations to Date	Maximum Value (Ultimate Value incl. options)	Total FTEs
MELE ASSOCIATES, INC.	DT0009595	Program	$2,721,497.00	$5,647,373.84	6
Parsons Government Services Inc.	DT0009614	Program	$2,900,000.00	$5,661,995.00	6
Parsons Government Services Inc.	DT0009655	Program	$388,344.99	$388,344.99	1.5
TIME SOLUTIONS, LLC	DT0009708	FSE	$182,259.00	$371,184.80	0.5
SIGMA SCIENCE INC	DT0009748	Program	$864,487.84	$864,487.84	1
CE2 CORPORATION, INC.	DT0009761	FSE	$4,026,525.00	$12,159,262.77	18
Parsons Government Services Inc.	DT0009845	Program	$1,213,486.00	$1,654,502.00	1.5
PROJECT ENHANCEMENT CORPORATION	DT0009849	Program	$1,711,979.25	$8,504,468.80	7
Parsons Government Services Inc.	DT0009966	Program	$1,689,847.00	$1,689,847.00	4
PROJECT ENHANCEMENT CORPORATION	DT0010008	FSE	$100,000.00	$195,949.10	0.5
WYANT DATA SYSTEMS, INC	DT0010108	Program	$3,500,000.00	$6,952,743.00	9
SIGMA SCIENCE, INC.	DT0010322	Program	$407,437.15	$407,437.15	1
Parsons Government Services Inc.	DT0010584	FSE	$999,988.00	$2,999,964.00	3
Parsons Government Services Inc.	DT0010585	Both Program & FSE	$1,069,831.00	$3,069,493.00	3
Parsons Government Services Inc.	DT0010586	FSE	$1,499,834.00	$4,464,832.00	3
SIGMA SCIENCE INC	DT0010601	Program	$491,614.87	$491,614.87	0.5
TECHSOURCE, INC.	DT0010708	Program	$642,800.00	$4,591,096.06	14
SIGMA SCIENCE INC	DT0010751	Program	$854,011.34	$854,011.34	0.5
LEIDOS, INC.	DT0010851	Program	$149,996.00	$149,996.00	1

Vendor Name	Order Number	Fund Description	Obligations to Date	Maximum Value (Ultimate Value incl. options)	Total FTEs
Parsons Government Services Inc.	DT0010869	Program	$350,000.00	$1,079,164.00	1.5
LONGENECKER & ASSOCIATES, INC.	DT0010988	Program	$154,108.00	$154,108.00	0.5
Parsons Government Services Inc.	DT0011023	Program	$641,743.67	$2,090,531.67	0.5
CORPORATE ALLOCATION SVCS, INC.	DT0011033	Program	$1,380,126.00	$4,412,994.94	6.5
Parsons Government Services Inc.	DT0011056	Program	$366,612.00	$366,612.00	0.5
Parsons Government Services Inc.	DT0011157	Program	$562,169.00	$1,381,930.00	2
TECHSOURCE, INC.	DT0011223	Program	$1,026,423.00	$5,346,459.19	7
J.G. MANAGEMENT SYSTEMS, INC.	DT0011413	Program	$335,164.40	$1,746,673.20	3
PROJECT ENHANCEMENT CORPORATION	DT0011426	Program	$7,656,335.00	$66,974,288.84	12
J.G. MANAGEMENT SYSTEMS, INC.	DT0011516	Program	$1,546,106.40	$8,043,495.60	7
CHENEGA GOVERNMENT CONSULTING, LLC	DT0011585	Program	$2,662,503.30	$3,275,715.74	37
SALMON GROUP, INC.	DT0011617	FSE	$415,000.00	$415,000.00	2
Parsons Government Services Inc.	DT0011750	Program	$101,356.00	$1,210,655.00	2
Parsons Government Services Inc.	DT0011766	Program	$3,174,094.60	$3,210,947.00	7.5
Parsons Government Services Inc.	DT0011792	Program	$499,965.00	$499,965.00	1.5
CE2 CORPORATION, INC.	DT0011828	FSE	$310,000.00	$946,330.20	1

Vendor Name	Order Number	Fund Description	Obligations to Date	Maximum Value (Ultimate Value incl. options)	Total FTEs
Parsons Government Services Inc.	DT0011884	Program	$500,000.00	$506,357.00	1.5
TECHSOURCE, INC.	DT0011895	Program	$697,309.41	$5,796,164.32	3.5
CENTRAL RESEARCH INC	DT0011912	FSE	$150,000.00	$272,266.85	4.2
SIGMA SCIENCE INC	DT0011966	Program	$226,773.56	$226,773.56	1
TECHSOURCE, INC.	DT0012050	Program	$500,000.00	$3,396,990.27	4
Vector Resource, Inc	DT0012067	Program	$760,000.00	$2,548,589.93	3
Parsons Government Services Inc.	DT0012090	Program	$109,103.00	$149,014.00	2
Vector Resource, Inc	DT0012209	FSE	$108,686.40	$878,625.58	1
SIGMA SCIENCE INC	DT0012297	Program	$127,802.49	$127,802.49	1
INTERNATIONAL SERVICES AND ADVISORS, INC	Unavailable	Program	$7,384,340.87	$7,704,340.87	4
RUSSIAN & GRAPHICS INC	Unavailable	Program	$55,000.00	$221,695.00	1
LTD GLOBAL, LLC	Unavailable	FSE	$2,008,625.00	$2,839,417.76	4.5
AMERICAN FEDERAL SECURITY & K-9 SOLUTIONS - 2, LLC	Unavailable	Program	$1,883,793.20	$2,915,091.00	10
COUNTY OF NYE	Unavailable	Program	$1,875,428.30	$3,070,953.00	6
BANDA GROUP INTERNATIONAL, LLC	Unavailable	Program	$2,857,068.00	$4,302,674.00	4
LTD GLOBAL, LLC	Unavailable	Program	$1,097,337.79	$2,826,020.79	1
HENRY L STIMSON CENTER	Unavailable	Program	$895,700.00	$1,961,229.22	1.4
PMTECH, INC.	Unavailable	Program	$4,360,387.20	$6,106,211.37	15
Lakeworth Group, LLC, The	Unavailable	Program	$176,000.00	$4,000,000.00	1
ALUTIIQ COMMERCIAL ENTERPRISES LLC	Unavailable	FSE	$2,240,754.00	$6,873,545.00	12
BANDA GROUP INTERNATIONAL, LLC	Unavailable	FSE	$232,920.00	$813,664.00	2
LTD GLOBAL, LLC	Unavailable	FSE	$342,314.13	$1,799,315.54	4

Vendor Name	Order Number	Fund Description	Obligations to Date	Maximum Value (Ultimate Value incl. options)	Total FTEs
PERTEK, LLC	Unavailable	Program	$1,163,421.84	$3,574,485.20	8
PERTEK, LLC	Unavailable	Program	$828,128.24	$3,430,643.84	4
DOXCELERATE CORPORATION	Unavailable	FSE	$167,896.00	$687,892.00	2
VETERAN SOLUTIONS, INC	Unavailable	Program	$148,700.00	$2,070,999.00	2.5
BANDA GROUP INTERNATIONAL, LLC	Unavailable	Program	$910,720.00	$3,810,113.00	2
BANDA GROUP INTERNATIONAL, LLC	Unavailable	Program	$1,252,917.00	$3,872,640.00	3
LTD GLOBAL, LLC	Unavailable	FSE	$143,000.00	$1,841,106.43	3.5
SYNERGY SOLUTIONS, INCORPORATED	Unavailable	Both Program & FSE	$37,481,121.98	$38,787,334.00	60
Grand Total			**$449,263,986.22**	**$787,925,836.01**	**788.8**

Federal Salaries and Expenses

Federal Salaries and Expenses

Federal Salaries and Expenses
Proposed Appropriation Language

For expenses necessary for Federal Salaries and Expenses in the National Nuclear Security Administration, $418,595,000, to remain available until September 30, 2019, including official reception and representation expenses not to exceed $12,000

Note.—A full-year 2017 appropriation for this account was not enacted at the time the budget was prepared; therefore, the budget assumes this account is operating under the Further Continuing Appropriations Act, 2017 (P.L. 114–254). The amounts included for 2017 reflect the annualized level provided by the continuing resolution.

Explanation of Changes

The FY 2018 Budget Request for NNSA Federal Salaries and Expenses (FSE) supports recruitment, training, and retention of a highly skilled federal workforce for effective program and project management and federal oversight of $12 billion in funding to maintain the nuclear weapons stockpile; support the nuclear modernization program, principally in Life Extension Programs (LEPs) and major construction projects; and execute NNSA's prevent, counter, and response nonproliferation efforts. The FY 2018 Budget Request for NNSA FSE is $418,595,000, a $54,829,000 (15.1 percent) increase above the FY 2016 Enacted level, which included a one-time rescission of $19,900,000 for a construction project previously funded in FSE. Excluding the rescission, the FY 2018 Request reflects a 9.1 percent increase above the FY 2016 Enacted level to pay for the salaries, benefits, and other expenses of 1,715 federal full-time equivalents (FTEs). The Request includes a 1.9 percent cost of living increase; 5.5 percent benefit escalation; transfers additional funding to the Department's Working Capital Fund; and includes a functional transfer of $2,000,000 from FSE to Weapons Activities, Information Technology and Cybersecurity program for NNSA Field Office federal unclassified information technology and telecommunication costs.

NNSA projects a total FSE workforce of 1,680 by the end of FY 2017 and 1,715 by the end of FY 2018. The requested level reflects a reduction from NNSA's planned 1,740 FTE level for FY 2018 as identified in the FY 2017 Budget Request.

NNSA is on track to formulate a comprehensive Agency Reform Plan, in accordance with OMB Memorandum 17-22. The goal is to create a lean, accountable, more efficient government; effectively and efficiently deliver NNSA programs; and align the NNSA federal workforce to meet the needs of today and the future. As NNSA enters the next phase of the nuclear modernization efforts, a highly skilled federal workforce will be required for appropriate oversight principally in Life Extension Programs (LEPs) and major project management. As of mid-March 2017, NNSA on-board staffing levels were 16.8 percent lower than FY 2010 FTE levels, while funding has increased 27.7 percent from FY 2010 Enacted levels to the FY 2017 request for Weapons Activities and Defense Nuclear Nonproliferation, primarily for the nuclear modernization program.

Working with U.S. Office of Personnel Management (OPM) experts, NNSA is developing a Human Capital Management Plan (HCMP) that institutionalizes a consistent staffing analysis and career development methodology to support NNSA management responsibilities and prepare for an anticipated wave of retirements. Succession planning is critical since 44 percent of the current NNSA workforce will be eligible to retire by 2022. The NNSA workforce plan will focus on long-term shaping of the federal workforce to ensure the right skills mix at all levels. Specifically, strategic consideration of each business line and methods to gain efficiencies, eliminate redundancies and unnecessary bureaucracy, and ensure resources are aligned to mission requirements is paramount to an achievable HCMP. This includes critically thinking about recruiting and hiring actions and conducting workforce planning activities to align NNSA workforce with current and future mission needs.

Public Law Authorizations

- P.L. 106-65, National Nuclear Security Administration Act, as amended
- P.L. 114-328, National Defense Authorization Act for Fiscal Year 2017
- Consolidated Appropriations Act, 2017

Federal Salaries and Expenses [a]

	FY 2016 Enacted	FY 2017 Annualized CR*	FY 2018 Request
	(dollars in thousands)		
NNSA Federal Salaries and Expenses	383,666	382,937	418,595
Rescission of Prior Year Balances	-19,900	-19,000	0
Total Federal Salaries and Expenses, Net of Rescissions	**363,766**	**363,937**	**418,595**

* The FY 2017 Annualized CR amounts reflect the P.L. 114-254 continuing resolution level annualized to a full year. These amounts are shown only at the congressional control level and above, below that level, a dash (-) is shown.

Overview

NNSA's **Federal Salaries and Expenses** (FSE) pays for costs associated with recruiting, training, and maintaining a federal staff to perform program and project management and appropriate oversight of $12 billion in Weapons Activities and Defense Nuclear Nonproliferation funding across the nuclear security enterprise. FSE provides for the salaries and benefits of 1,715 FTEs, space and occupancy needs, travel costs, support service contractors, training, and other related expenses. 74 percent of FSE funds are for employee salaries and benefits.

The NNSA workforce consists of a diverse cadre of project managers, scientists, engineers, foreign affairs specialists, and highly technical support staff. The workforce also is comprised of mission support staff in information technology and cybersecurity, corporate project management, procurement and contract management, safety and health, cost estimating and program evaluation, financial management, human capital management, and legal services. The Department of Energy (DOE) and NNSA collaboratively work to identify ways to reduce overlap in mission support functions to minimize funding required to achieve our mission. NNSA is physically disbursed throughout the United States, reflecting NNSA's work with the nuclear security enterprise. FSE funds federal staff geographically located in Washington, DC; Germantown, Maryland; Albuquerque, New Mexico; and at seven federal field offices: Kansas City Field Office (Missouri); Lawrence Livermore Field Office (California); Los Alamos Field Office (New Mexico); Nevada Field Office (Nevada); NNSA Production Office (Texas and Tennessee); Sandia Field Office (New Mexico); and Savannah River Field Office (South Carolina).

NNSA also manages the Department's overseas presence, including placing DOE staff in foreign countries. NNSA supervises both federal employees and locally employed staff, and reimburses the Department of State for International Cooperative Administrative Support Services (ICASS) and Capital Security Cost Sharing (CSCS) charges. DOE funds its overseas presence through the Working Capital Fund (WCF) for consistent administrative and operational support to Departmental personnel.

Highlights of the FY 2018 Budget Request

NNSA's FY 2018 Request supports a federal staff level of 1,715 FTEs for the effective program and project management and appropriate oversight of the nuclear security enterprise. NNSA's FY 2016 Federal Management Financial Integrity Act (FMFIA) report identified NNSA's current staffing levels as posing a high risk to the success of the NNSA mission. NNSA has also benchmarked its current staffing profile for the LEPs and contract management against comparable programs in the Department of Defense, and the results demonstrated NNSA is understaffed to meet its mission in an effective and efficient manner. In FY 2017, NNSA partnered with OPM to develop an HCMP that institutionalizes a consistent staffing analysis and career development methodology to support NNSA management responsibilities and prepare for an anticipated wave of retirements.

[a] The FY 2016 Consolidated and Further Continuing Appropriations Act, 2016, includes a one-time rescission of prior year balances of $19,900,000. The FY 2017 amount reflects the P.L. 114-254 continuing resolution annualized level.

Department of Energy (DOE) Working Capital Fund (WCF) Support

FSE funds a majority of NNSA contributions to the Department's WCF, a financial management tool for improving the delivery of common administrative services. NNSA's FY 2018 projected FSE contribution to the WCF is $44,340,000, an increase from FY 2016 Enacted levels to reflect increases in telecommunications and building occupancy offset by reductions to other business lines. The Department's WCF budget chapter details the programs funded through the WCF.

Entry Level Hires

The NNSA supports programs, including OPM's Presidential Management Fellows (PMF) program, Graduate Fellowship Program (NGFP), and Minority Serving Institutions Partnership Program (MSIPP), to recruit and train the next generation of professionals at NNSA and the nuclear security enterprise. These programs foster the pipeline of qualified, skilled specialists who will sustain expertise in the nuclear security enterprise.

In FY 2018, the FSE appropriation will provide up to $1,400,000 for NGFP support and development activities.

Federal Salaries and Expenses
Funding by Congressional Control

	(dollars in thousands)			
	FY 2016 Enacted	FY 2017 Annualized CR*	FY 2018 Request	FY 2018 vs FY 2016
NNSA Federal Salaries and Expenses	383,666	382,937	418,595	+ 34,929
Rescission of Prior Year Balances	-19,900	-19,000	0	+ 19,900
Total Federal Salaries and Expenses, Net of Rescissions	**363,766**	**363,937**	**418,595**	**54,829**

* The FY 2017 Annualized CR amounts reflect the P.L. 114-254 continuing resolution level annualized to a full year. These amounts are shown only at the congressional control level and above, below that level, a dash (-) is shown.

Overview

Salaries and Benefits: Provides $308,225,000 for the federal staff that performs program and project management and appropriate oversight of the national security missions related to the safety and reliability of the nuclear weapons stockpile, emergency response, nuclear nonproliferation efforts, safeguards and security oversight, strategic coordination of counterterrorism and counter-proliferation initiatives, and safe, secure, and compliant facilities and infrastructure. Also provides federal staff for mission support to include: information technology and cybersecurity, cost estimating and program evaluation, procurement, financial management, human capital, legal services, and safety and health.

Travel: Provides $12,077,000 for federal domestic and foreign travel necessary to conduct NNSA business. Domestic travel provides management oversight, public outreach, and national security assistance and interface between NNSA Headquarters, the NNSA Field Offices, the DOE laboratories and production facilities, and local governments. International travel is a key element of the nonproliferation work.

Support Services: Includes $28,275,000 for Management and Professional Services to assist or train staff to achieve efficient and effective management and operation of organizations, activities, and systems, including administrative support, funding for Environmental Safety and Health activities, Corporate Project Management program, and the NGFP. Funding also supports improved cost estimation and financial systems integration, in accordance with Section 3112 and Section 3128 of the FY 2014 National Defense Authorization Act.

Other Expenses: Provides $70,017,000 for the following items:

Training: Provides $5,771,000 for necessary learning, career development, and skills maintenance of the NNSA Federal staff. Includes valuable learning activities for NNSA Headquarters and Field Offices, and corporate training and corporate travel related to training, as managed by the NNSA's Chief Learning Officer. The NNSA corporate training program encompasses the Technical Qualification Program (TQP) and federal and agency mandated training (such as executive, managerial, and supervisory training). It also funds corporate programs training and travel, including: Leadership Development Programs, Mid-Level Leadership Development Program; Executive Development Program; 360 Assessments; Rotations; NNSA 1st Year (Onboarding) Program; Mentoring; Coaching; and other learning events. Lastly, these funds provide funding for specific organizations, with a heavy emphasis on individual employees' training and developmental needs.

Space and Occupancy/Working Capital Fund: Supports $59,312,000 in Space and Occupancy costs for Headquarters and the field including FSE’s contribution to the Department’s WCF and overall operations and maintenance of both rented and federally owned space.

Other Expenses: Provides $4,934,000 in funding for activities required for NNSA’s federal personnel, including field site investigations in coordination with the DOE General Counsel and other miscellaneous procurements, such as potential settlements.

Federal Salaries and Expenses

Program Direction

(Dollars in Thousands)

	FY 2016 Enacted	FY 2017 Annualized CR*	FY 2018 Request	FY 2018 vs FY 2016
NNSA Federal Salaries and Expenses				
Headquarters				
Salaries and Benefits	166,630	176,663	211,951	+45,321
Travel	10,726	9,918	10,146	-580
Support Services	31,020	25,521	26,084	-4,936
Other Related Expenses	50,250	44,039	55,422	+5,172
Total, Headquarters	**258,626**	**256,141**	**303,603**	**+44,977**
Total, Full Time Equivalents	**1,063**	**1,126**	**1,187**	**124**
Livermore Field Office				
Salaries and Benefits	14,323	14,267	16,440	+2,117
Travel	345	293	297	-48
Support Services	587	528	566	-21
Other Related Expenses	2,807	1,731	1,505	-1,302
Total, Livermore Field Office	**18,062**	**16,819**	**18,808**	**+746**
Total, Full Time Equivalents	**74**	**74**	**83**	**9**
Los Alamos Field Office				
Salaries and Benefits	13,530	13,463	15,124	+1,594
Travel	351	259	263	-88
Support Services	342	715	337	-5
Other Related Expenses	639	488	461	-178
Total, Los Alamos Field Office	**14,862**	**14,925**	**16,185**	**+1,323**
Total, Full Time Equivalents	**78**	**78**	**84**	**6**

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Federal Salaries and Expenses
Program Direction, Continued

(Dollars in Thousands)

	FY 2016 Enacted	FY 2017 Annualized CR*	FY 2018 Request	FY 2018 vs FY 2016
Sandia Field Office				
Salaries and Benefits	13,149	13,976	14,576	+1,427
Travel	267	195	231	-36
Support Services	75	180	162	+87
Other Related Expenses	7,378	8,078	7,917	+539
Total, Sandia Field Office	**20,869**	**22,429**	**22,886**	**+2,017**
Total, Full Time Equivalents	**79**	**81**	**83**	**+4**
Nevada Field Office				
Salaries and Benefits	13,733	14,368	15,671	+1,938
Travel	257	231	234	-23
Support Services	312	315	337	+25
Other Related Expenses	1,424	1,563	1,530	+106
Total, Nevada Field Office	**15,726**	**16,477**	**17,772**	**+2,046**
Total, Full Time Equivalents	**74**	**77**	**81**	**7**
NNSA Production Office (NPO)				
Salaries and Benefits	20,608	21,637	23,021	+2,413
Travel	652	555	564	-88
Support Services	371	352	377	+6
Other Related Expenses	2,461	2,464	2,403	-58
Total, NNSA Production Office	**24,092**	**25,008**	**26,365**	**+2,273**
Total, Full Time Equivalents	**122**	**126**	**130**	**8**

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Federal Salaries and Expenses[a]
Program Direction, Continued

(Dollars in Thousands)

	FY 2016 Enacted	FY 2017 Annualized CR*	FY 2018 Request	FY 2018 vs FY 2016
Kansas City Field Office				
Salaries and Benefits	5,826	5,710	6,224	+398
Travel	215	167	195	-20
Support Services	179	266	333	+154
Other Related Expenses	480	844	695	+215
Total, Kansas City Field Office	**6,700**	**6,987**	**7,447**	**+747**
Total, Full Time Equivalents	**37**	**35**	**38**	**1**
Savannah River Field Office				
Salaries and Benefits	4,520	4,816	5,218	+698
Travel	143	124	147	+4
Support Services	66	78	79	+13
Other Related Expenses	100	133	85	-15
Total, Savannah River Field Office	**4,829**	**5,151**	**5,529**	**+700**
Total, Full Time Equivalents	**26**	**28**	**29**	**3**
NNSA Federal Salaries and Expenses				
Salaries and Benefits	252,319	264,900	308,225	+55,906
Travel	12,956	11,742	12,077	-879
Support Services	32,952	27,955	28,275	-4,677
Other Related Expenses	65,539	59,340	70,018	+4,479
Total, NNSA Federal Salaries and Expenses	**363,766**	**363,937**	**418,595**	**+54,829**
Total, FTEs Requested	**1,553**	**1,625**	**1,715**	**162**

* The FY 2017 Annualized CR amounts reflect the P.L. 114-254 continuing resolution level annualized to a full year. These amounts are shown only at the congressional control level and above, below that level, a dash (-) is shown.

[a] The FY 2016 Consolidated and Further Continuing Appropriations Act, 2016, includes a one-time rescission of Federal Salaries and Expenses prior year balances of $19,900,000 from the NNSA Albuquerque Facility. The FY 2017 level reflects the P.L. 114-254 continuing resolution level annualized to a full year.

Federal Salaries and Expenses

	FY 2016 Enacted	FY 2017 Annualized CR*	FY 2018 Request	FY 2018 vs FY 2016
	(Dollars in Thousands)			
Support Services				
Management and Professional Services	22,914	17,917	18,115	-4,799
Environmental Safety and Health Support	175	175	175	0
Corporate Project Management Support	9,863	9,863	9,985	122
Total, Support Services	**32,952**	**27,955**	**28,275**	**-4,677**
Other Related Expenses				
Training	**4,422**	**5,771**	**5,771**	**1,349**
Space and Occupancy Costs	**15,100**	**15,860**	**14,972**	**-128**

* The FY 2017 Annualized CR amounts reflect the P.L. 114-254 continuing resolution level annualized to a full year. These amounts are shown only at the congressional control level and above, below that level, a dash (-) is shown.

Support Services and Other Related Expenses, Continued

Headquarters Working Capital Fund (WCF)	FY 2016 Enacted	FY 2017 Annualized CR*	FY 2018 Request	FY 2018 vs FY 2016
	(Dollars in Thousands)			
Supplies	502	502	423	-79
Mail Services	676	676	0	-676
Copying Service	730	730	0	-730
Printing and Graphics	367	367	0	-367
Building Occupancy	16,311	5,867	19,424	+3,113
Telecommunications	5,160	5,160	10,130	+4,970
Procurement (DCAA)	210	210	0	-210
Corporate Training Services	218	218	429	+211
Project Management (PMCDP)	368	368	0	-368
iMANAGE	3,463	3,463	2,405	-1,058
Financial Statement Audits	77	77	0	-77
Internal Control (A-123)	36	36	0	-36
Indirect	0	0	0	0
Pensions	65	65	0	-65
Overseas Representation	10,246	10,246	11,259	1,013
Interagency Transfers to GSA	2,199	2,199	0	-2,199
Health Services	392	392	270	-122
TOTAL, Headquarters Working Capital Fund (WCF)	**41,020**	**30,576**	**44,340**	**3,320**
Other Expenses				
Other Services	4,985	7,121	4,922	-63
Reception and representation	12	12	12	0
Subtotal, Other Expenses	**4,997**	**7,133**	**4,934**	**-63**
Total, Other Related Expenses	**65,539**	**59,340**	**70,017**	**4,478**

[a] The FY 2016 Consolidated and Further Continuing Appropriations Act, 2016, includes a one-time rescission of Federal Salaries and Expenses prior year balances of $19,900,000 from the NNSA Albuquerque Facility. The FY 2017 level reflects the P.L. 114-254 continuing resolution level annualized to a full year.

Federal Salaries and Expenses
Program Direction

Activities and Explanation of Changes

FY 2016 Enacted	FY 2018 Request	Explanation of Changes FY 2018 vs. FY 2016
Salaries and Benefits $252,319,000	**Salaries and Benefits $308,225,000**	**Salaries and Benefits +$55,906,000**
• Provided support for an NNSA federal staff of 1,553 (FTEs; with the use of $17,566,000 unobligated carryover, actual obligations for salaries and benefits were $269,885,000 • Included 1.3% cost of living adjustment (COLA), other pay escalation, and 5.3% benefit escalation	• Provides support for an NNSA federal staff of 1,715 full-time equivalents FTEs • With the national security exemption received from the President’s federal hiring freeze, project a total workforce of 1,680 by the end of FY 2017 • Includes 1.9% COLA, other pay escalation, and 5.5% benefit escalation	• As NNSA enters the next phase of the nuclear modernization efforts, a highly skilled federal workforce will be required for appropriate program and project oversight principally in LEPs and major project management • NNSA staffing levels are low compared to other DOE Program Offices and Department of Defense offices • Working with OPM, NNSA is developing an HCMP that will institutionalize a consistent staffing analysis and career development methodology to support NNSA management responsibilities and prepare for an anticipated wave of retirements, with 44 percent of the current workforce eligible to retire by 2022.
Travel $12,956,000	**Travel $12,077,000**	**Travel -$879,000**
• Supports domestic and foreign travel necessary as part of NNSA’s mission	• Supports domestic and foreign travel necessary as part of NNSA’s mission	• Decrease reflects travel efficiencies
Support Services $32,952,000	**Support Services $28,275,000**	**Support Services -$4,677,000**
• Includes Management and Professional Services; Environment Safety and Health support; NGFP support; and the Corporate Project Management program	• Includes Management and Professional Services; Environment Safety and Health support; NGFP support; and the Corporate Project Management program	• Reduction is consistent with NNSA’s FY 2016 plans for one-time increases for select projects, such as: National Academy of Sciences and National Academy of Public Administration reviews of NNSA governance reform; OPM organizational assessments; human resource contractor services on a temporary basis while NNSA increased hiring; quality management initiatives and DOE’s document tracking system (eDocs)

FY 2016 Enacted	FY 2018 Request	Explanation of Changes FY 2018 vs. FY 2016
Other Related Expenses $65,539,000	**Other Related Expenses $70,018,000**	**Other Related Expenses +$4,479,000**
• Provides funding for Space and Occupancy costs at Headquarters and field sites; includes the contribution to the DOE WCF to provide overall operations and maintenance of both rented and federal-owned space; necessary training and skills maintenance of the NNSA federal staff; and miscellaneous procurements	• Provides funding for Space and Occupancy costs at Headquarters and field sites; includes the contribution to the DOE WCF to provide overall operations and maintenance of both rented and federal-owned space; necessary training and skills maintenance of the NNSA federal staff; and miscellaneous procurements	• Reflects an increase of $3,320,000 for WCF expenses primarily for building occupancy and telecommunications offset by reductions to other business lines • Reflects an increase of $2,248,000 for Field Site Investigations, beginning in FY 2017 • Reflects an increase of $1,349,000 for Federal employee training • Increases are partially offset by reductions for a functional transfer of $2,000,000 from FSE to Weapons Activities, Information Technology and Cybersecurity for field office information technology support requirements and telecommunication costs.

Federal Salaries & Expenses
Performance Measures

In accordance with the GPRA Modernization Act of 2010, the Department sets targets for, and tracks progress toward, achieving performance goals for each program.

	FY 2016	FY 2017	FY 2018
Performance Goal (Measure)	**Federal Administrative Costs -** Maintain the Office of the Administrator Federal administrative costs as a percentage of total Weapons Activities and Defense Nuclear Nonproliferation program costs at less than 6%.		
Target	5.9 %	5.9 %	5.9 %
Result	Met - 3.7	TBD	TBD
Endpoint Target	In keeping with OMB and DOE expectations that administrative costs be minimized, maintain the Office of the Administrator Federal administrative costs as a percentage of total Weapons Activities and Defense Nuclear Nonproliferation program costs at less than 6%.		

Department Of Energy
FY 2018 Congressional Budget
Funding By Appropriation By Site
($K)

Federal Salaries and Expenses	FY 2016 Enacted	FY 2017 Annualized CR	FY 2018 Request
Kansas City Site Office			
Federal Salaries and Expenses			
Federal Salaries and Expenses	6,700	6,987	7,447
Total, Kansas City Site Office	**6,700**	**6,987**	**7,447**
Livermore Site Office			
Federal Salaries and Expenses			
Federal Salaries and Expenses	18,062	16,819	18,808
Total, Livermore Site Office	**18,062**	**16,819**	**18,808**
Los Alamos Site Office			
Federal Salaries and Expenses			
Federal Salaries and Expenses	14,862	14,925	16,185
Total, Los Alamos Site Office	**14,862**	**14,925**	**16,185**
Nevada Field Office			
Federal Salaries and Expenses			
Federal Salaries and Expenses	15,726	16,477	17,772
Total, Nevada Field Office	**15,726**	**16,477**	**17,772**
NNSA Production Office (NPO)			
Federal Salaries and Expenses			
Federal Salaries and Expenses	24,092	25,008	26,365
Total, NNSA Production Office (NPO)	**24,092**	**25,008**	**26,365**
Sandia Site Office			
Federal Salaries and Expenses			
Federal Salaries and Expenses	20,869	22,429	22,886
Total, Sandia Site Office	**20,869**	**22,429**	**22,886**
Savannah River Site Office			
Federal Salaries and Expenses			
Federal Salaries and Expenses	4,829	5,151	5,529
Total, Savannah River Site Office	**4,829**	**5,151**	**5,529**
Washington Headquarters			
Federal Salaries and Expenses			
Federal Salaries and Expenses	278,526	275,141	303,603
Total, Washington Headquarters	**278,526**	**275,141**	**303,603**
Total, Federal Salaries and Expenses	**383,666**	**382,937**	**418,595**

Weapons Activities

Weapons Activities

Weapons Activities

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Weapons Activities
Proposed Appropriation Language

For Department of Energy expenses, including the purchase, construction, and acquisition of plant and capital equipment and other incidental expenses necessary for atomic energy defense weapons activities in carrying out the purposes of the Department of Energy Organization Act (42 U.S.C. 7101 et seq.), including the acquisition or condemnation of any real property or any facility or for plant or facility acquisition, construction, or expansion, $10,239,344,000, to remain available until expended: Provided, That of such amount, $105,600,000 shall be available until September 30, 2019, for program direction.

Note.—A full-year 2017 appropriation for this account was not enacted at the time the budget was prepared; therefore, the budget assumes this account is operating under the Further Continuing Appropriations Act, 2017 (P.L. 114–254). The amounts included for 2017 reflect the annualized level provided by the continuing resolution.

Explanation of Change

The FY 2018 Budget Request provides a 15.7% increase from the FY 2016 Enacted Level to maintain the current Program of Record, including maintaining the safety, security, and effectiveness of the nuclear stockpile, supporting the nuclear modernization program, improving the outdated infrastructure of the nuclear security enterprise, and increases to physical and cyber security.

FY 2018 funding increases are requested in a number of areas, including:

- **Directed Stockpile Work (DSW)** includes increases in Life Extension Programs (LEP) and Major Alterations (Alt) support planned workscope for the W80-4 LEP, and updates baseline estimates for the B61-12 LEP, and the W88 Alteration program. This additional funding is required to stay aligned with the Department of Defense (DOD) current nuclear modernization plans.

- **Strategic Materials** support the increases in activities to meet future pit production and tritium requirements. The Tritium Sustainment increase is affected by fuel costs for Tennessee Valley Authority (TVA) reactors to support transition from the use of one to two reactors to produce tritium to meet projected requirements. Plutonium Sustainment is increased to support achievement of required pit production capabilities in congressionally directed timeframes.

- **Research, Development, Testing, and Evaluation (RDT&E)** is increased to conduct plutonium experiments, sustain trusted microsystems capabilities, and support continued viability of our high performance computing platforms and associated design codes. The Request also initiates the Stockpile Responsiveness program, as required in the FY 2016 National Defense Authorization Act (NDAA). Increases in Advanced Radiography and Nuclear Survivability programs improve or recapitalize NNSA's plutonium experimental capabilities via the Enhanced Capabilities for Subcritical Experiments project and trusted microsystems capability project, respectively. Advanced Simulation and Computing also increases funding for NNSA's exascale program for the continued viability of future high performance computing platforms.

- **Infrastructure and Operations (I&O)** funding is increased to continue to halt the growth in deferred maintenance, improve working conditions of NNSA's aging facilities and equipment, and address safety and programmatic risks. The Request increases funding for the Uranium Processing Facility (UPF) and Chemistry & Metallurgy Research Building Replacement (CMRR) Project to support ceasing operations in existing aged facilities by 2025 and 2019, respectively. Increased funding is also requested for the Albuquerque Complex Project to provide modern working conditions for 1,000 federal staff who currently work mostly in modified barracks built during the Manhattan Project era.

- **Secure Transportation Asset (STA)** funding is increased for procurement of long-lead parts and materials for the two full-scale Mobile Guardian Transporter prototype systems.

Public Law Authorizations

- P.L. 106-65, National Nuclear Security Administration Act, as amended
- P.L. 114-328, National Defense Authorization Act for Fiscal Year 2017
- Consolidated Appropriations Act, 2017

Weapons Activities

	(Dollars in Thousands)			
	FY 2016 Enacted	FY 2017 Annualized CR*	FY 2018 Request	FY 2018 vs FY 2016
Weapons Activities	8,846,948	8,830,130	10,239,344	+1,392,396
Total, Weapons Activities	**8,846,948**	**8,830,130**	**10,239,344**	**+1,392,396**

* The FY 2017 Annualized CR amounts reflect the P.L. 114-254 continuing resolution level annualized to a full year. These amounts are shown only at the congressional control level and above, below that level, a dash (-) is shown.

Overview

Programs funded in the Weapons Activities appropriation support the Nation's current and future defense posture and necessary nationwide infrastructure of science, technology and engineering capabilities without conducting underground testing. Weapons Activities provides for the maintenance and refurbishment of nuclear weapons to continue sustained confidence in their safety, reliability, and performance; investment in scientific, engineering, and manufacturing capabilities for certification of the enduring nuclear weapons stockpile; and manufacture of nuclear weapon components. Weapons Activities also provides for maintenance and investment in the NNSA nuclear complex infrastructure to be more responsive and cost effective.

NNSA's Management and Operating (M&Os) contractors employ approximately 39,000 people to deliver these programs, primarily at eight geographical sites, are managed by a Federal workforce, composed of civilian and military staff. Additional details about these programs will be included in the FY 2018 Stockpile Stewardship and Management Plan (SSMP), planned for release in June 2017.

Highlights and Major Changes in the FY 2018 Budget

The program described in this request supports the current Program of Record as described in the FY 2017 Future Years Nuclear Security Plan (FYNSP), with fact-of-life adjustments made from the progression of existing activities and programs, updated cost estimates, and necessary adjustments to requirements due to ongoing planning. NNSA continues to surveil, assess, and sustain the stockpile while pursuing three life extension programs and a major alteration, all aligned with DOD schedules. The UPF and CMRR projects are replacing key facilities. The maintenance, repair, and recapitalization of facilities continues to be an area of increased focus.

The major elements of the appropriation highlights include the following:

Directed Stockpile Work (DSW)
DSW encompasses activities that support the nuclear weapons stockpile. These activities include maintenance and surveillance; planned refurbishment; reliability assessment; weapon dismantlement and disposition; and research, development, and certification of technology efforts to meet stockpile requirements and strategic materials. Requested increases in Life Extension Programs (LEP) and Major Alterations (Alt) support planned workscope for the W80-4 LEP, and updates baseline estimates for the B61-12 LEP, and the W88 Alteration program. This funding is needed to stay aligned with Department of Defense schedules. Increases are included for Plutonium Sustainment to fabricate four to five development (DEV) W87 pits. Continue investments to replace end-of-life equipment for pit production, and install equipment to increase production capacity. The Tritium Sustainment increase supports increased production of TVA reactor fuel and operational costs. An increase in Domestic Uranium Enrichment supports the start of an effort to down blend available stocks of highly enriched uranium for use in tritium production, which delays the need date for a domestic uranium enrichment capability.

Research, Development, Test, and Evaluation (RDT&E) Programs
RDT&E will develop and maintain critical capabilities, tools, and processes needed to support science-based stockpile stewardship, refurbishment, and continued certification of the stockpile without the use of underground nuclear testing.

The FY 2018 request funds required annual assessments and increases funding in several areas to support future LEP options and system certification, including Hydrodynamic and subcritical experiments and Enhanced Capabilities for Subcritical Experiments. Funding is also increased in FY 2018 for Advanced Simulation and Computing, particularly exascale projects to transition integrated codes to work efficiently on emerging, high-performance computers; develop next-generation codes; maintain computing resources and facilities; and resources to collaborate with industry for addressing NNSA requirements as high-performance computing evolves. The Inertial Confinement Fusion Ignition and High Yield program continues operations at NNSA's three major high energy density facilities – National Ignition Facility (NIF) at Lawrence Livermore National Laboratories (LLNL), Z Pulsed Power facility at Sandia National Laboratories (SNL), and Omega at Rochester University. These programs provide key data that reduces uncertainty in calculations of nuclear weapons performance. Finally, NNSA is proposing an increase to Nuclear Survivability in the Engineering program to sustain NNSA's trusted microsystems capability.

Infrastructure and Operations (I&O)
I&O maintains, operates, and modernizes the NNSA infrastructure in a safe, secure, and cost-effective manner. Infrastructure and Operations activities provide a comprehensive approach to arresting the declining state of NNSA infrastructure while maximizing return on investment, supporting program deliveries, and reducing enterprise risk. The program also plans, prioritizes, and constructs state-of-the-art facilities, infrastructure, and scientific tools through Capabilities Based Investments and line item construction projects. For FY 2018, funding will continue the stabilization of deferred maintenance, execute Recapitalization projects to improve the condition and extend the design life of structures, capabilities, and systems to meet program demands; decrease overall operating costs; and reduce safety, security, environmental, and program risk. Funding is also requested initiate construction/procurements primarily for UPF's Main Process Building, Mechanical Electrical Building, and Salvage and Accountability Building subprojects. The increase also supports continued construction in CMRR to sustain plutonium science activities. Increased funding also provides for general-purpose construction projects including the construction of the Albuquerque Complex Project to replace the aging and degrading Federal facility.

Secure Transportation Asset (STA)
STA supports the safe, secure movement of nuclear weapons, special nuclear material, and weapon components to meet projected DOE, DOD, and other customer requirements. The Program Direction in this account provides for the secure transportation workforce, including Federal agents. In FY 2018, the STA will continue workforce capability and asset modernization initiatives. These initiatives include a project to increase the number of Federal Agent applicants, the Safeguards Transporter (SGT) Risk Reduction Initiatives to manage the SGT beyond its design life, procurement of long-lead parts and materials for the two full-scale Mobile Guardian Transporter prototype systems, and deferred facilities maintenance and minor construction projects at multiple sites.

Defense Nuclear Security (DNS)

DNS provides protection for NNSA nuclear weapons and special nuclear materials, facilities, and personnel against a full spectrum of threats, ranging from local security incidents to terrorism. This program employs over 1,500 protective force officers, and 1,100 additional security professionals and support staff responsible for meeting all security requirements at NNSA sites. The FY 2018 Request includes funding for previously vacant positions in key security program areas at the sites, such as classified matter protection, technical surveillance countermeasures, and nuclear materials measurements, accounting, and physical inventory. It also includes preliminary planning and conceptual design funds future projects to sustain and recapitalize the Perimeter Intrusion Detection and Assessment Systems (PIDAS) at the Pantex and Y-12 sites.

Information Technology and Cybersecurity (IM)
IM provides for a range of information technology (IT) support functions and manages NNSA's cybersecurity programs both working with NNSA's M&Os and contributing funding into DOE's Working Capital Fund (WCF). In FY 2018, the program will support the recapitalization of the Enterprise Secure Network, modernize cybersecurity infrastructure, implement the Identity Control and Access Management project at NNSA Headquarters and site elements, execute and coordinate Public Key Infrastructure and other Committee on National Security Systems requirements, and continue to leverage the NNSA Network Vision framework to increase the efficiency and cost-effectiveness of NNSA IT services, consistent with the DOE Cyber Strategy. The Budget Request includes a $2 million topline transfer from NNSA's Federal Salaries and Expenses (FSE) account to IM for IM to manage all IT work at NNSA's Field Offices. IM previously managed this work using FSE funds.

Crosscutting programs

The FY 2018 Budget Request continues crosscutting programs across the Department to improve the overall efficiency and effectiveness of DOE's mission. These crosscutting initiatives are discussed further within the Programs in which the crosscuts are funded.

Cybersecurity Crosscut: The Department of Energy (DOE) is engaged in three categories of cyber-related activities: protecting the DOE enterprise from a range of cyber threats that can adversely impact mission capabilities, bolstering the U.S. Government's capabilities to address cyber threats, and improving cybersecurity in the electric power subsector and the oil and natural gas subsector. The cybersecurity crosscut supports central coordination of the strategic and operational aspects of cybersecurity and facilitates cooperative efforts such as the Joint Cybersecurity Coordination Center (JC3) for incident response and the implementation of Department-wide Identity Control and Access Management (ICAM).

Exascale Computing: Exascale computing systems, capable of at least one billion billion (1×10^{18}) calculations per second, are needed to support areas of research that are critical to national security objectives as well as to applied scientific research. Exascale systems' computational power is also needed to provide increasingly capable data-analytic and data-intense applications across the entire Federal complex. Exascale is a component of long-term collaboration between DOE's Office of Science Advanced Scientific Computing Research (ASCR) program and NNSA's Advanced Simulation and Computing (ASC) program. This collaboration also supports cross-agency activities with the DOD, the National Cancer institute, and others.

DOE Working Capital Fund (WCF) Support

NNSA Weapons Activities appropriation projected contribution to the DOE WCF for FY 2018 is $33,389,000. This funding covers certain shared enterprise activities including managing enterprise-wide systems, data, and telecommunications and supporting the integrated acquisition environment.

Legacy Contractor Pensions

This funding provides the annual Weapons Activities share of the DOE's reimbursement of payments made to the University of California (UC) Retirement Plan (UCRP) for former UC employees and annuitants who worked at the Lawrence Livermore National Laboratory (LLNL) and Los Alamos National Laboratory (LANL). The UCRP benefit for these individuals is a legacy cost and DOE's annual payment to the UC is required by contract. The amount of the annual payment is based on the actuarial valuation report and is covered by the terms described in the contracts. The UC Board of Regents voted in November 2015 to include more conservative assumptions on mortality and interest rates increasing NNSA's costs in FY 2018 relative to the FY 2018 column of the FY 2017 FYNSP. NNSA's budget request supports the increased costs and readjusted the split between Weapons and DNN to reflect the changes in relative shares of total NNSA funding in FY 2018. These contracts will be paid through the Legacy Contractor Pensions line item.

Entry Level Hires

The NNSA supports a variety of programs to help train and recruit the next generation of leaders in managing the nuclear stockpile, nonproliferation, nuclear security, and international security, such as the NNSA Graduate Fellowship Program (NGFP) and Minority Serving Institutions Partnership Program (MSIPP). These programs foster the pipeline of qualified professionals who will sustain expertise in these areas through future employment in the nuclear security enterprise. In FY 2018, the Weapons Activities appropriation anticipates spending about $2,900,000 on the NGFP program.

Weapons Activities
Funding by Congressional Control

	FY 2016 Enacted	FY 2017 Annualized CR*	FY 2018 Request	FY 2018 vs FY 2016
Directed Stockpile Work				
Life Extension Programs and Major Alterations				
B61 Life Extension Program	643,300	616,079	788,572	+145,272
W76 Life Extension Program	244,019	222,880	224,134	-19,885
W78/88-1 Life Extension Program	0	0	0	0
W88 Alteration Program (formerly W88 ALT 370)	220,176	281,129	332,292	+112,116
W80-4 Life Extension Program	195,037	220,253	399,090	+204,053
Total, Life Extension Programs and Major Alterations	**1,302,532**	**1,340,341**	**1,744,088**	**+441,556**
Stockpile Systems				
B61 Stockpile Systems	52,247	57,313	59,729	+7,482
W76 Stockpile Systems	50,921	38,604	51,400	+479
W78 Stockpile Systems	64,092	56,413	60,100	-3,992
W80 Stockpile Systems	68,005	64,631	80,087	+12,082
B83 Stockpile Systems	42,177	41,659	35,762	-6,415
W87 Stockpile Systems	89,299	81,982	83,200	-6,099
W88 Stockpile Systems	115,685	103,074	131,576	+15,891
Total, Stockpile Systems	**482,426**	**443,676**	**501,854**	**+19,428**
Weapons Dismantlement and Disposition	**52,000**	**56,000**	**52,000**	**0**
Stockpile Services				
Production Support	447,527	457,043	470,400	+22,873
Research and Development Support	41,059	34,187	31,150	-9,909
Research and Deveopment Certification and Safety	185,000	152,481	196,840	+11,840
Managemement, Technology, and Production	264,994	251,978	285,400	+20,406
Total, Stockpile Services	**938,580**	**895,689**	**983,790**	**+45,210**
Strategic Materials				
Uranium Sustainment	32,916	20,988	20,579	-12,337
Plutonium Sustainment	174,698	184,970	210,367	+35,669
Tritium Sustainment	104,600	109,787	198,152	+93,552
Domestic Uranium Enrichment	50,000	50,000	60,000	+10,000
Strategic Materials Sustainment	250,040	212,092	206,196	-43,844
Total, Strategic Materials	**612,254**	**577,837**	**695,294**	**+83,040**
Total, Directed Stockpile Work	**3,387,792**	**3,313,543**	**3,977,026**	**+589,234**

	(Dollars in Thousands)			
	FY 2016 Enacted	FY 2017 Annualized CR*	FY 2018 Request	FY 2018 vs FY 2016
Research, Development, Test and Evaluation (RDT&E)				
Science				
Advanced Certification	58,747	58,747	57,710	-1,037
Primary Assessment Technologies	95,512	95,512	89,313	-6,199
Dynamic Materials Properties	100,400	100,400	122,347	+21,947
Advanced Radiography	45,700	50,500	37,600	-8,100
Secondary Assessment Technologies	72,900	72,900	76,833	+3,933
Academic Alliances and Partnerships	49,800	49,800	52,963	+3,163
Enhanced Capabilities for Subcritical Experiments	0	0	50,755	+50,755
Total, Science	**423,059**	**427,859**	**487,521**	**+64,462**
Engineering				
Enhanced Surety	50,821	37,196	39,717	-11,104
Weapon Systems Engineering Assessment Technology	17,371	17,371	23,029	+5,658
Nuclear Survivability	24,461	40,705	45,230	+20,769
Enhanced Surveillance	38,724	38,724	45,147	+6,423
Stockpile Responsiveness	0	0	40,000	+40,000
Total, Engineering	**131,377**	**133,996**	**193,123**	**+61,746**
Inertial Confinement Fusion Ignition and High Yield				
Ignition	76,334	76,334	79,575	+3,241
Support of Other Stockpile Programs	22,843	22,843	23,565	+722
Diagnostics, Cryogenics and Experimental Support	58,587	63,722	77,915	+19,328
Pulsed Power Inertial Confinement Fusion	4,963	4,963	7,596	+2,633
Joint Program in High Energy Density Laboratory Plasmas	8,900	8,900	9,492	+592
Facility Operations and Target Production	339,423	339,423	334,791	-4,632
Total, Inertial Confinement Fusion Ignition and High Yield	**511,050**	**516,185**	**532,934**	**+21,884**
Advanced Simulation and Computing	**623,006**	**648,095**	**709,244**	**+86,238**
Construction	0	0	25,000	+25,000
Total, Advanced Simulation and Computing	**623,006**	**648,095**	**734,244**	**+111,238**
Advanced Manufacturing Development				
Additive Manufacturing	12,600	12,600	12,000	-600
Component Manufacturing Development	99,656	46,583	38,644	-61,012
Process Technology Development	17,800	28,522	29,896	+12,096
Total, Advanced Manufacturing Development	**130,056**	**87,705**	**80,540**	**-49,516**
Total, RDT&E	**1,818,548**	**1,813,840**	**2,028,362**	**+209,814**

	(Dollars in Thousands)			
	FY 2016 Enacted	**FY 2017 Annualized CR***	**FY 2018 Request**	**FY 2018 vs FY 2016**
Infrastructure and Operations				
Operating				
Operations of Facilities			868,000	+868,000
Kansas City National Security Campus	100,250	100,250		-100,250
Lawrence Livermore National Laboratory	70,671	70,671		-70,671
Los Alamos National Laboratory	196,460	196,460		-196,460
Nevada National Security Site	89,000	89,000		-89,000
Pantex	58,021	55,000		-58,021
Sandia National Laboratories	115,300	115,300		-115,300
Savannah River Site	80,463	80,463		-80,463
Y-12 National Security Complex	120,625	107,000		-120,625
Total, Operations of Facilities	**830,790**	**814,144**	**868,000**	**+37,210**
Safety and Environmental Operations	107,701	110,000	116,000	+8,299
Maintenance and Repair of Facilities	277,000	294,000	360,000	+83,000
Recapitalization				
Infrastructure and Safety	253,724	289,488	312,492	+58,768
Capability Based Investments	98,800	98,800	114,850	+16,050
Subtotal, Recapitalization	**352,524**	**388,288**	**427,342**	**+74,818**
Total, Operating	**1,568,015**	**1,606,432**	**1,771,342**	**+203,327**
Construction	711,109	801,785	1,031,795	+320,686
Total, Infrastructure and Operations	**2,279,124**	**2,408,217**	**2,803,137**	**+524,013**

* The FY 2017 Annualized CR amounts reflect the P.L. 114-254 continuing resolution level annualized to a full year. These amounts are shown only at the congressional control level and above, below that level, a dash (-) is shown.

	(Dollars in Thousands)			
	FY 2016 Enacted	**FY 2017 Annualized CR***	**FY 2018 Request**	**FY 2018 vs FY 2016**
Secure Transportation Asset (STA)				
Operations and Equipment	140,000	157,820	219,464	+79,464
Program Direction - Albuquerque	97,118	98,618	105,600	+8,482
Total, Secure Transportation Asset	**237,118**	**256,438**	**325,064**	**+87,946**
Defense Nuclear Security				
Operations and Maintenance	639,891	648,512	686,977	+47,086
Security Improvements Program	30,000	0	0	-30,000
Construction	13,000	13,000	0	-13,000
Total, Defense Nuclear Security	**682,891**	**661,512**	**686,977**	**+4,086**
Information Technology and Cybersecurity	**157,588**	**170,088**	**186,728**	**+29,140**
Legacy Contractor Pensions	**283,887**	**248,492**	**232,050**	**-51,837**
Subtotal, Weapons Activities	**8,846,948**	**8,872,130**	**10,239,344**	**+1,392,396**
Rescission of Prior Year Balances	**0**	**-42,000**	**0**	**0**
Total, Weapons Activities	**8,846,948**	**8,830,130**	**10,239,344**	**+1,392,396**

* The FY 2017 Annualized CR amounts reflect the P.L. 114-254 continuing resolution level annualized to a full year. These amounts are shown only at the congressional control level and above, below that level, a dash (-) is shown.

Research and Development

The Office of Management and Budget (OMB) Circular No. A-11, "Preparation, Submission, and Execution of the Budget," requires the reporting of research and development (R&D) data. Consistent with this requirement, R&D activities funded by NNSA Weapons Activities programs are displayed below.

(Dollars in Thousands)

	FY 2016 Enacted	FY 2017 Annualized CR*	FY 2018 Request	FY 2018 vs FY 2016
Research and Development (R&D)				
Basic	0	0	0	0
Applied	4,389,479	4,393,231	5,197,897	+808,418
Development	83,599	81,395	84,160	+561
Subtotal, R&D	**4,473,078**	**4,474,626**	**5,282,057**	**+808,979**
Equipment	116,229	121,680	122,909	+6,680
Construction	0	11,500	47,100	+47,100
Total, R&D	**4,589,307**	**4,607,806**	**5,452,066**	**+862,759**

* The FY 2017 Annualized CR amounts reflect the P.L. 114-254 continuing resolution level annualized to a full year. These amounts are shown only at the congressional control level and above, below that level, a dash (-) is shown.

Directed Stockpile Work (DSW)

Overview

The Directed Stockpile Work (DSW) program encompasses five major subprograms that sustain the nation's nuclear weapons stockpile. The subprograms are: (1) Life Extension Programs (LEPs) and Major Alterations (ALTs), which extend the lifetime of the nation's nuclear stockpile and enable the nuclear security enterprise to respond to 21st century threats; (2) Stockpile Systems, which directly executes sustainment activities for all enduring weapons systems in the stockpile (B61, W76, W78, W80, B83, W87, and W88); (3) Weapons Dismantlement and Disposition (WDD), which removes retired weapons and components from the stockpile; (4) Stockpile Services, which provides the foundation, skills, and capabilities for the research, development, production, and maintenance within the nuclear security enterprise to meet national requirements; and (5) Strategic Materials, which ensures sustainment of nuclear material processing capabilities and funds the stabilization, consolidation, disposition, tracking, and accounting of nuclear materials. DSW contributes to meeting the enhancement of nuclear security through defense, nonproliferation, and environmental efforts by sustaining the safety, security, and effectiveness of the Nation's nuclear deterrent without nuclear testing as described in the National Nuclear Security Administration (NNSA) Stockpile Stewardship and Management Plan (SSMP).

This Budget Request supports the nuclear weapons program approved by the Nuclear Weapons Council (NWC) in a memorandum dated August 29, 2016, and described in the FY 2018 SSMP. The baseline plan outlined in the memorandum, which is subject to modification(s) as a new Nuclear Posture Review is developed, includes modernization through life extension of the Nation's stockpile that implements the 3+2 Strategy. This strategy transitions the stockpile to three interoperable ballistic missile warheads (each type would have a common nuclear explosive package and common or adaptable non-nuclear components) deployed on both the Submarine Launched Ballistic Missile (SLBM) and the Intercontinental Ballistic Missile (ICBM) systems and two air-delivered warheads/bombs deployed on aircraft.

DSW executes the program pursuant to the program of record as provided by the Nuclear Weapons Council. In doing so, DSW: (1) provides unique skills, equipment, testers, and logistics to enable nuclear weapons operations; (2) extends the life of existing weapons systems through authorized modifications and alterations to address technical issues and to enhance their safety, security, and effectiveness; (3) modernizes, produces and replaces limited life components (LLCs); (4) conducts other scheduled weapons maintenance; (5) conducts surveillance and evaluations to assess weapons reliability as well as detect and anticipate potential weapons issues; (6) quantifies margins of uncertainty in order to assess and certify the nuclear stockpile; (7) develops technology for enhanced safety, security, and effectiveness for insertion during weapon modifications/alterations; (8) provides dismantlement and disposition of weapons and components for weapons retired from the stockpile, thereby supporting nonproliferation and international goals; (9) compiles and analyzes information during the Annual Assessment process to identify and address issues; (10) develops new technologies, matures appropriate replacements for sunset technologies, and enhances system capabilities for multi-system applications including neutron generators (NGs), gas transfer systems (GTSs), power sources, explosives, detonators, initiation systems, surety systems, and Arming, Fuzing & Firing (AF&F) systems, to reduce lifecycle costs and address near-term and long-term stockpile needs; (11) enhances NNSA transportation safety and security by implementing new weapon shipping configurations; (12) sustains the nuclear materials production, handling, and storage capabilities to meet long-term national requirements; (13) produces tritium necessary for the national inventory and the increased capacity required for the nuclear weapons mission; (14) ensures development of a reliable and economic supply of enriched uranium; and (15) mitigates the risk of adversarial subversion of the stockpile susceptible to foreign capability by providing Nuclear Enterprise Assurance and hedging against technological surprise.

The DSW Budget Request for FY 2018 is $3,977,026,000. This represents a 17.4% or $589,234,000 increase above the FY 2016 Funding level. Within DSW, the budget request for LEPs increased by $441,556,000 due to the increase of the B61-12 LEP production hardware and testing of this hardware to qualify the B61-12, an increase on the expanded work scope for the W88 Alteration Program including its conventional high explosives (CHE) refresh activities, and the ramp up of engineering activities for development and design on the W80-4. The request for Stockpile Systems increased by $19,428,000 primarily due to an increase in Development Studies/Capability Improvements for implementing surety enhancements through the Integrated Surety Architectures (ISA) initiative. WDD maintains level funding as required to meet NNSA's goal to dismantle the quantity of weapons retired prior to FY 2009 by FY 2022, eliminating the planned acceleration stated in the FY 2017 budget request. The request for Stockpile Services represents an increase of $45,210,000 predominantly in two mission areas: (1) Production Support for engineering operations, manufacturing operations and quality supervision and control, internal containers at Pantex and Y-12, and increased labor throughout the enterprise to meet delivery schedules; and (2) Management, Technology, and Production for assessments and studies (Use Control); equipment procurements supporting LEP First Production Unit (FPU) schedules, the enduring stockpile, and external deliverables; and multi-system surveillance consistent with requirements to assess the stockpile. Strategic Materials increased by $83,040,000 to support additional activities associated with increased tritium production, plutonium pit production, and downblending for the Domestic Uranium Enrichment program.

Highlights of the FY 2018 Budget Request

Life Extension Programs and Major Alterations

- Execute the B61-12 LEP activities in Phase 6.4 (Production Engineering) in accordance with the integrated schedule to meet an FY 2020 FPU.
- Execute the W76-1 LEP to meet the current deliverables and submarine deployment requirements in agreement with the Department of the Navy.
- Complete at least 90% of W76-1 LEP cumulative production unit builds.
- Execute the W88 Alteration Program activities in Phase 6.4 in accordance with the integrated schedule to meet an FY 2020 FPU.
- Execute Phase 6.2A (Design Definition and Cost Study) activities for the W80-4 LEP with an FY 2025 FPU in support of the Air Force Long Range Stand-Off (LRSO) program.

Stockpile Systems

- Complete development, qualification, production and delivery of all scheduled LLCs for the B61, W76, W78, W80, B83, W87, and W88. LLCs include GTSs, NGs, and alteration kits delivered to the Department of Defense (DOD) and the Pantex Plant to sustain the nuclear weapons stockpile.
- Conduct surveillance programs for all weapon systems using data collection from flight tests, laboratory tests, and component evaluations to assess stockpile reliability, performance and safety.
- Conduct assessment activities for all weapon systems including the in-depth testing and analysis of systems, subsystems, and components required for the Annual Assessment process.
- Continue to analyze, evaluate, and close high priority Significant Finding Investigations (SFIs) in accordance with the currently approved baseline closure plans.
- Conduct development studies and/or capability improvements for implementing surety improvements for the B61, W80, and the W88 through the NNSA Integrated Surety Architectures (ISA) initiative.

Weapons Dismantlement and Disposition

- Dismantlement quantities will not exceed those described in the FY 2016 Stockpile Stewardship and Management Plan submitted in March 2015.
- Reflects the funding required to meet NNSA's goal to dismantle the quantity of weapons retired prior to FY 2009 by FY 2022, eliminating the planned acceleration stated in the FY 2017 budget request.
- Provides recycled special materials for LEPs, Naval Reactors and other uses (e.g., Lithium Bridging Strategy).

Stockpile Services (provides the overall foundation for capabilities, capacity, and site-specific R&D activities within the nuclear security enterprise (NSE) necessary to sustain DSW essential requirements, activities and deliverables)

Production Support

- Provide the manufacturing capabilities (e.g., engineering, manufacturing, quality assurance) and capacity for Life Extension Program (LEP) production, enduring stockpile weapon assembly, weapon disassembly, component special materials and depleted uranium production, weapon safety and surveillance testing, and reliability testing as required to meet directive schedules and meet DOD delivery schedules. Demands on Production Support continue to increase as the enterprise ramps up to meet LEP production schedules. Production Support's FY 2018 request represents a modest 5.1% increase from the FY 2016 funding level to ensure manufacturing capabilities and capacity are aligned to support the additional LEP scope for FY 2018.

- Support manufacturing investments at Los Alamos National Laboratory (LANL) for detonator and Detonator Cable Assemblies (DCA) production and at Sandia National Laboratories (SNL) Neutron Generator Enterprise. Both sites are increasing to five product lines, including new equipment to enable higher yield rates, increased maintenance/calibration services, and improving shop floor efficiency.
- Continue engineering and quality assurance preparations at Kansas City National Security Campus (KCNSC) for B61-12 LEP non-nuclear component production.
- Continue the Lithium Bridging Strategy through Direct Material Manufacturing and Material Conversion equipment restart activities at Y-12.
- Continue the Manufacturing Modernization Project (MMP) at LANL to support digital product production and acceptance, specifically completing the upgrade for the pit manufacturing line.

Research and Development Support

- Continue archiving weapons data and upgrading research and development (R&D) and engineering tools to remain current with evolving technologies.
- Continue supporting the Nuclear Testing Heritage program, which maintains capabilities to resume nuclear testing if commanded by the President.
- Utilize and maintain the Joint Integrated Lifecycle Surety (JILS) tool to evaluate potential surety improvements to the NSE.
- Provide scientific and technical support to the production plants to help achieve weapon production directives.

Research and Development Certification and Safety

- Continue to provide the capabilities and capacity within the nuclear security enterprise necessary to sustain DSW activities.
- Complete the Annual Assessment Process for the stockpile, deliver the Laboratory Director Letters to the President, and support the Weapons Reliability Report (WRR) to DOD.
- Develop multiple-system technologies and conduct exploratory studies to address current and emerging stockpile issues, as well as develop replacement LLCs due to sunset technologies
- Execute the Joint Technology Demonstrator (JTD) project, a US-UK strategic collaboration to explore technology applications in a systems-context, reduce risks for future insertion, enhance workforce design and production skills, and identify process improvements for the NSE.

Management, Technology, and Production

- Continue stockpile sustainment activities providing products, components, and/or services for multi-weapon surveillance, weapons reliability reporting to DOD, weapon logistics and accountability, and stockpile planning.
- Support development of multi-system surveillance testers (stronglink, environmental testing equipment, and centrifuges) required to support LEP testing requirements.
- Support additional multi-system weapon response and external production resources to increase weapon response services and conduct nuclear safety studies to ensure un-interrupted manufacturing/assembly/disassembly operations at production plants.
- Increase in Use Control studies and equipment procurements to align with FPUs, and enduring stockpile refresh opportunities.
- Continue the multi-year effort to upgrade and integrate the weapons Logistics, Accountability, Planning and Scheduling (LAPS) system used throughout the enterprise.
- Continue efforts to re-establish special nuclear material manufacturing capability and capacity at Y-12.
- Support increased flight testing support and related equipment at Tonopah Test Range.

Strategic Materials

- Uranium Sustainment
  - Continue Area 5 de-inventory efforts to reduce safety and security risks.
  - Develop, sustain, and increase the reliability of uranium scientific and manufacturing capabilities to reduce mission risks.
- Plutonium Sustainment
  - Fabricate four to five development (DEV) W87 pits.
  - Continue investments to replace equipment for pit production that is at end-of-life, install equipment to increase production capacity and support certification activities to reduce mission risk.
- Tritium Sustainment
  - Complete irradiation of 1104 TPBARs in the Watts Bar Unit 1 (WBN1) in Cycle 15 and commence irradiation of 1408 TPBARs for Cycle 16 in WBN1.
  - Submit a License Amendment Request (LAR) to the Nuclear Regulatory Commission (NRC) and continue preparing Watts Bar Unit 2 (WBN2) for tritium production.
  - Conduct one extraction at the Tritium Extraction Facility (TEF), before increasing extraction in the following year.
- Domestic Uranium Enrichment (DUE)
  - Preserve and advance uranium enrichment expertise and technology to meet current and future U.S. Government needs.
  - Continue the acquisition process to approve the alternative selection and cost range (Critical Decision (CD)-1) for a domestic uranium enrichment capability to support tritium production.
  - Support and manage downblending of HEU from the uranium inventory.
- Strategic Materials Sustainment
  - Continue to provide improved processes for recycling and recovery of plutonium, enriched uranium, lithium, tritium, and other materials from fabrication and assembly operations, limited life components, dismantlement of weapons and nuclear components and provide for an adequate purified depleted uranium supply.
  - Recycle and purify materials to meet specifications for safe, secure, and environmentally acceptable storage; meet the directive schedule for tritium reservoir refills, and support the increased workload associated with LEP production rates, weapon surveillance and dismantlement activities, and RDT&E and weapon sustainment work in the nuclear facilities.
  - Continue de-inventory of LANL's Chemistry and Metallurgy Research (CMR) and PF-4 vault facilities to support the transition to plutonium production.
  - Continue Y-12's increase in purified metal production and the processing and disposition of legacy materials toward the 2025 goal of ceasing programmatic operations in Building 9212.
  - Provide for receipt, storage, inventory, and management of pits, highly enriched uranium (HEU), and other weapon nuclear and non-nuclear materials.

FY 2016 Accomplishments
Life Extension Programs and Major Alterations
- B61-12 LEP received authorization to proceed into Phase 6.4 in June 2016.
- B61-12 LEP conducted over 25 system tests to verify aircraft compatibility and functional performance in both normal and abnormal environments.
- B61-12 LEP successfully passed System Level Baseline Design Review (BDR), which culminated in over 40 individual component and variant Baseline Design Reviews being completed.
- B61-12 LEP successfully passed the Preliminary Design Review and Acceptance Group review, a DOD-led panel validating that the baseline design meets the requirements, in May 2016.
- B61-12 LEP updated the cost estimate for the program through publishing the Baseline Cost Report.
- Completed all FY 2016 scheduled deliveries for the W76-1 LEP to the Department of the Navy. Achieved completion of 67% (two-thirds) of the total production and delivery quantities per the current program of record.
- W88 Alteration Program continued design and fabrication of prototype functional hardware at component, sub-assembly, and AF&F level for qualification testing.

- W88 Alteration Program successfully completed a System BDR.
- W88 Alteration Program fully integrated the additional scope associated with the CHE Refresh.
- W88 Alteration Program successfully completed the Demonstration and Shakedown Operations (DASO) -26 development flight test.
- W88 Alteration Program completed the Preliminary Design Review and Acceptance Group review.
- Completed Phase 6.1 (Concept Assessment) activities for the W80-4 (cruise missile warhead) LEP and obtained NWC approval to begin Phase 6.2.
- W80-4 LEP successfully completed Internal Requirements Gate Review.
- W80-4 LEP released the first revisions of the Overarching Program Plan, Phase Gate, Requirements, Risk management, Program Controls, and Program Protection Plans. First drafts of the WDCR Guidance, System Engineering Management, and Vol 1-3 of the Program Controls Plans were also completed.
- W80-4 LEP completed and signed 5 of the 8 planned Interface Agreements with other NNSA Programs in support of the LEP.

Stockpile Systems

- Delivered all scheduled LLCs for the B61, W76, W78, W80, B83, W87, and W88.
- Conducted surveillance activities for all weapon systems using data collection from flight tests, laboratory tests, and component evaluations to assess stockpile reliability without nuclear testing. Surveillance and assessment testing culminated in completion of all Annual Assessment Reports and generation of Laboratory Director Letters to the President.
- Completed the FPU of new B61 Joint Test Assembly (JTA) configurations via successful conduct of the JTA Modernization project.
- Completed renewal of the B61 Nuclear Explosive Safety Study (NESS) for disassembly operations to allow continuation of nuclear explosive operations at CNS-PX.
- W76 initiated JTA 1 refresh activities.
- Completed FPU of the new NG for the W80-1.
- Completed final B83 report for cycle 112 Canned Sub-Assemblies (CSA) and completed surveillance disassembly and inspection (D&I) for cycle 113 CSA ahead of schedule.
- Met DOD requirements for W87 Small Ferroelectric Neutron Generator retrofits.
- Successfully executed the first extended range flight tests carrying W78 and W87 instrumented JTAs.
- W88 developed a cost estimate for future ISA requirements and continued development for next NG/GTS LLC cycle.

Weapons Dismantlement and Disposition

- Continued to make progress on NNSA’s goal to ensure the quantity of weapons retired prior to FY 2009 are dismantled by to the end of FY 2022.
- Pantex Plant accomplished 102% of planned weapon dismantlements.
- Accomplished 109% of planned CSA dismantlements at Y-12 to support Naval Reactors and the Lithium Bridging Strategy.
- Successfully executed the first surveillance D&I of a W84 warhead in four-and-a-half years.
- Reduced legacy part inventories throughout the enterprise in accordance with site-specific disposition plans.

Stockpile Services
Production Support

- Improved Detonator and DCA manufacturing and inspection processes to improve yield from 44% to 78% while reducing build time from 27 months to 12 months at LANL.
- Began the Manufacturing Modernization Project (MMP), a multi-year project to transition the LANL production plant to digital product acceptance.
- Completed 112% of required NG builds and executed 100% of required NG shipments at SNL.
- Completed procurement of a focused ion beam microscope for supplier verification at KCNSC.
- Completed conceptual designs and planning estimates for two upgrade projects, unloading lasers and test data acquisition system, critical to sustaining the LLC and GTS Surveillance at Savannah River Site (SRS).
- Completed actions to support deployment of the Product Realization Information Management & Exchange (PRIME) system to replace the nuclear security enterprise’s Image Management System.

Research and Development Support

- Archived past weapons data and converted sunset technology files to state-of-the-art data storage/security systems.

Research and Development Certification and Safety

- Developed a more accurate method to ensure nuclear explosives are initiated uniformly.
- Supported development and realization of several major projects for the B61-12 LEP, W88 Alteration Program, and surety.

- Performed analyses in conjunction with the DOD to support key surety decisions for both NNSA and the DOD, and added new capabilities to accommodate cyber and insider threats.
- Exceeded goal for High Resolution Computed Tomography (HRCT) surveillances (CoLOSSIS) by ten percent.
- Demonstrated GTS design meets key DOD requirements and initiated pre-production activities ahead of schedule.
- Successfully fired a hydrodynamic test at LANL Dual-Axis Radiographic Hydrodynamic Test Facility (DARHT) as part of qualification efforts for the W88 legacy and W88 Alteration Program.
- Completed seven planned Joint Actinide Shock Physics Experimental Research (JASPER) plutonium shots, five Phoenix experiments, and one weapon system hydrodynamic experiment.
- Completed the Annual Assessment Process and Independent Nuclear Weapon Assessment Process (INWAP) activities.
- Provided direct support to Stockpile Systems for flight tests and development for new high explosives (HE) for flight test diagnostics and qualification activities.
- Established a collaborative model for technology development activities with counterparts from the United Kingdom.
- Achieved Technology Readiness Level (TRL) 5 on ISA base capability development for W88 ALT 940.
- Executed the W88 Alteration Program/940 ISA selection review and issued decision memorandum.
- Continued technology maturation of the ISA multi-application transportation device (MTAD) for all air-delivered weapons to support a Full-Scale Engineering Development start in FY 2018.
- Achieved a baseline design and prototype for a modular weapons controller technology that will enable agility and adaptability for the stockpile.
- Progressed the development of new initiation systems and materials to enhance the safety of the detonation train.
- Transitioned high output firing set electrical system design to the W80-4 for baselining and systems engineering.
- Completed development of cryptographic processor and transitioned the technology to the B61-12 LEP after successfully demonstrating decode functionality and status logging.
- Established interface requirements for Ground Based Strategic Deterrence bidder's library to include IW1 baseline interfaces and future system interfaces.

Management, Technology, and Production

- Submitted Weapons Reliability Reports to DOD.
- Completed all required FY 2016 shelf-life power supply surveillance at LANL following the Plutonium Facility (PF)-4 restart.
- Provided all required base spares including test equipment, handling gear, Code Management System items to the DOD.
- Provided direct support to Stockpile Systems for flight tests at Tonopah Test Range, Utah Test Range, and Kwajalein Atoll.
- Deployed the capability to share real-time telemetry data between Tonopah Test Range and Albuquerque in support of flight testing.
- Completed corrective maintenance on the rolling mill at Y-12 and machine press at Y-12 to begin re-establishing the capability to manufacture cases and CSAs for the LEPs and enduring stockpile.
- Replaced and certified the drive unit for the QU2369 Centrifuge at the Weapons Evaluation Test Laboratory (WETL).

Strategic Materials

- Continued irradiation of 704 TPBARs in Cycle 14 in WBN1 reactor.
- Commenced planning for tritium production in TVA's WBN2 reactor.
- Issued Record of Decision from Tritium Sustainment's Supplemental Environmental Impact Statement.
- Obtained NRC approval of License Amendment Request to permit up to 1792 TPBARs in WBN1.
- SRS completed the recycle and recovery of tritium ahead of schedule in support of DSW requirements.
- CNS Y-12 exceeded its goal to produce 200 kilograms of purified metal, demonstrating the ability to meet Defense Program requirements, replenish metal and provide a risk mitigation inventory.
- LANL significantly exceeded expectations for activities associated with TRU waste management at TA-55 for the High Efficiency Neutron Counter-3 (HENC-3) and mobile loading demonstration and obtained an additional 25 kg of Material at Risk (MAR) storage, helping to manage TRU waste issues until the Waste Isolation Pilot Plant opens.

- LANL accomplished significant work on risk reduction activities and vault material disposition, including reducing Material at Risk (MAR) on the PF-4 main floor by 22%.

Directed Stockpile Work
Funding

	(Dollars in Thousands)			
	FY 2016 Enacted	FY 2017 Annualized CR*	FY 2018 Request	FY 2018 vs FY 2016
Directed Stockpile Work				
Life Extension Programs and Major Alterations				
B61 Life Extension Program	643,300	616,079	788,572	+145,272
W76 Life Extension Program	244,019	222,880	224,134	-19,885
W78/88-1 Life Extension Program	0	0	0	0
W88 Alteration Program (formerly W88 ALT 370)	220,176	281,129	332,292	+112,116
W80-4 Life Extension Program	195,037	220,253	399,090	+204,053
Total, Life Extension Programs and Major Alterations	**1,302,532**	**1,340,341**	**1,744,088**	**+441,556**
Stockpile Systems				
B61 Stockpile Systems	52,247	57,313	59,729	+7,482
W76 Stockpile Systems	50,921	38,604	51,400	+479
W78 Stockpile Systems	64,092	56,413	60,100	-3,992
W80 Stockpile Systems	68,005	64,631	80,087	+12,082
B83 Stockpile Systems	42,177	41,659	35,762	-6,415
W87 Stockpile Systems	89,299	81,982	83,200	-6,099
W88 Stockpile Systems	115,685	103,074	131,576	+15,891
Total, Stockpile Systems	**482,426**	**443,676**	**501,854**	**+19,428**
Weapons Dismantlement and Disposition	**52,000**	**56,000**	**52,000**	**0**
Stockpile Services				
Production Support	447,527	457,043	470,400	+22,873
Research and Development Support	41,059	34,187	31,150	-9,909
Research and Deveopment Certification and Safety	185,000	152,481	196,840	+11,840
Managemement, Technology, and Production	264,994	251,978	285,400	+20,406
Total, Stockpile Services	**938,580**	**895,689**	**983,790**	**+45,210**
Strategic Materials				
Uranium Sustainment	32,916	20,988	20,579	-12,337
Plutonium Sustainment	174,698	184,970	210,367	+35,669
Tritium Sustainment	104,600	109,787	198,152	+93,552
Domestic Uranium Enrichment	50,000	50,000	60,000	+10,000
Strategic Materials Sustainment	250,040	212,092	206,196	-43,844
Total, Strategic Materials	**612,254**	**577,837**	**695,294**	**+83,040**
Total, Directed Stockpile Work	**3,387,792**	**3,313,543**	**3,977,026**	**+589,234**

* The FY 2017 Annualized CR amounts reflect the P.L. 114-254 continuing resolution level annualized to a full year. These amounts are shown only at the congressional control level and above, below that level, a dash (-) is shown.

Directed Stockpile Work
Explanation of Major Changes
(Dollars in Thousands)

	FY 2018 vs FY 2016
Directed Stockpile Work	
Life Extension Programs and Major Alteration: The increase represents a ramp up of $145,272 for a scope increase for B61-12 LEP production activities to include procurement and qualification of production testers, hardware, and tooling; a W76-1 LEP decrease of $19,885 is primarily due to the completion of advanced procurements for some W76-1 LEP parts and materials at KCNSC; an increase of $112,116 for Phase 6.4 activities associated with the W88 Alteration Program and the full incorporation of CHE Refresh; a previously planned increase of $204,053 for activities associated with transitioning from Phase 6.2 to Phase 6.2A in the W80-4 LEP; and an overall increase to LEP staffing requirements for the Product Realization Teams (PRT) at laboratories and production facilities across the nuclear security enterprise. Of the increase for the B61-12 since the FY 2017 Budget Request, $62 million represents an increase above the FY18 cost reported in the most recent Selected Acquisition Report (SAR). This increase is based on the approved B61-12 LEP Baseline Cost Report, which was completed in 2016 and updates the previous program cost estimate reflected in the SAR. The B61-12 LEP total program cost increased 3.6% from the 2013 SAR to $7.6B. The increase in FY18 is due to LEP support activities being transferred to the B61-12 LEP and increased program costs at Pantex and Y-12. Of the increase for the W88 Alteration Program, $77 million represents an increase above the FY18 cost reported in the most recent SAR. This increase is based on the approved W88 Alteration Program Baseline Cost Report, which was completed in 2016 and updates the previous program cost estimate reflected in the SAR. The W88 Alteration Program total program cost increased 11% from the 2015 SAR to $2.6B. The increase in FY 2018 is largely due to increased scope in flight/ground qualification and additional testing at Los Alamos.	+441,556
Stockpile Systems: The increase represents a $2,086 increase in Weapon Maintenance activities for production of LLCs that include GTS, NGs, and refurbishment and replacement of aging components to sustain stockpile life; a slight increase of $1,057 in Weapons Surveillance primarily for component testing; a $5,768 decrease in Weapon Assessment and Support to include a reduction in activities associated with planning, developing, and updating the technical basis for materials and components; and an increase of $22,053 in Development Studies/Capability Improvements for implementing surety enhancements through the NNSA Integrated Surety Architectures (ISA) initiative.	+19,428
Weapons Dismantlement and Disposition: The level funding represents the funding required to meet NNSA's goal to dismantle the quantity of weapons retired prior to FY 2009 by FY 2022, eliminating the planned 20 percent acceleration stated in the FY 2017 budget request.	0
Stockpile Services: The increase represents $22,873 in Production Support to fund primarily Engineering Operations, Manufacturing Operations and Quality Supervision and Control, internal containers at Pantex and Y-12, and increased labor throughout the enterprise to meet delivery schedules; a decrease in Research and Development Support of $9,909 to address other higher priorities such as deferred maintenance and secure transportation; an increase in Research and Development Certification and Safety of $11,840 for the Dual-Axis Hydrodynamic Test Facility at LANL and Site 300 Flash X-Ray Linear Accelerator (FXR) facility at Lawrence Livermore National Laboratory (LLNL), support of hydrodynamic	+45,210

	FY 2018 vs FY 2016
experiments and approaches to accelerating the engineering for these experiments, and support at Nevada to provide capabilities needed for execution of subcritical experiments; and an increase in Management, Technology, and Production of $20,406 predominantly for Assessments and Studies (Use Control), multi-system surveillance tester development, and for equipment procurements supporting LEP FPUs.	
Strategic Materials: The increase is driven by (1) Tritium Sustainment (+$93,552) to support increased irradiation of TBPARs at TVA, increased TPBAR fabrication and procurement of components, increases in reactor fuel costs, and increases in operational costs at TEF; (2) Plutonium Sustainment (+$35,669) to support additional personnel and equipment needed to ramp pit production to meet requirements; and (3) Domestic Uranium Enrichment (+$10,000) to support material preparation for the downblending campaign, scheduled to start in FY 2019. Increases are offset by decreases in (1) Strategic Material Sustainment (-$43,844) due to the deferral of reestablishing a purified depleted uranium feedstock capability and transferring requirements from the Strategic Planning Efforts program to other programs in DSW, I&O and RDT&E; and (2) Uranium Sustainment (-$12,337) due to the rebalancing of resources to more efficiently execute the uranium strategy.	+83,040
Total, Directed Stockpile Work	**+589,234**

Directed Stockpile Work
Life Extension Programs and Major Alterations

Description

Life Extension Programs (LEPs) and Major Alterations (Alts) is the stockpile management program necessary to extend the expected life of stockpile systems for an additional 20 to 30 years. NNSA, in conjunction with DOD, executes a LEP following the Phase 6.X process guidelines. This process provides a framework to conduct and manage refurbishment activities for existing weapons. For the purposes of this justification, the term "refurbishment" refers to all nuclear weapon Alterations and modifications to include life extension, modernization, and revised military requirements. It makes the maximum use of the established structure, flow, and practices from the traditional phased process for new warheads. It is not intended to replace Phase 6, Quantity Production and Stockpile, activities such as routine maintenance, stockpile evaluation, enhanced surveillance, baselining, and annual certification. Therefore, this process is actually an expanded subset of the traditional Phase 6 process and has been termed the Phase 6.X process. Phase 6.1, Concept Assessment, should provide sufficient information for the NWC to authorize Phase 6.2, Feasibility Study and Design Options. Follow-on phases include: Phase 6.2A, Design Definition and Cost Study; Phase 6.3, Development Engineering; Phase 6.4, Production Engineering; Phase 6.5, First Production and Phase 6.6, Full-Scale Production. All phases are conducted in accordance with the joint DOD/DOE Procedural Guidelines for the Phase 6.X Process.

B61-12 Life Extension Program

The B61-12 LEP will address multiple components nearing their end of life, as well as military requirements for reliability, service life, field maintenance, safety, and use control. NNSA, in coordination with the Air Force, studied a number of design alternatives to address the military's requirements, ranging from component replacement alterations to full-scope nuclear and non-nuclear refurbishments. The joint effort also included a separate study to assess the schedule and costs for each alternative. The selected option includes refurbishment of both nuclear and non-nuclear components to address aging, to assure extended service life, and to improve the safety, effectiveness, and security of the bomb. It also incorporates component reuse where possible and omits higher-risk technologies to reduce costs and schedule risks. With these upgrades and the addition of new Air Force components, the B61-12 LEP will consolidate and replace the B61-3, -4, -7, and -10 bombs variants and will reduce the number of gravity bombs. In June 2016, NNSA authorized the program to transition into Phase 6.4. The FPU is scheduled for FY 2020.

W76-1 Life Extension Program

The W76-1 LEP extends the life for an additional 30 years. NNSA completed the FPU in FY 2008 and is providing the reentry body assembly and delivery components to DOD for integration into the Trident II D5 Strategic Weapon System, which is part of the submarine-launched ballistic missile (SLBM) force.

IW1

In June 2012, the NWC authorized a Phase 6.2 study for a W78/88-1 LEP interoperable warhead. In May 2014, the NWC agreed to defer this program until FY 2020 with a new projected FPU in FY 2030. Consequently, no funding is requested in FY 2018. In February 2017, DOD and NNSA representatives agreed to use the term "IW1" rather than "W78/88-1 LEP" to reflect that IW1 replaces capability rather than extending the life of current stockpile systems.

W88 Alteration Program

The W88 Alteration Program addresses lifetime requirements by modernizing the AF&F system, improving surety, and incorporating a lightning arrestor connector. It also provides required logistical spares for sustaining the life of the system. As planned, the design of the arming and fuzing portion of the AF&F will be forward compatible with future Air Force fuze requirements and/or LEPs. The maintenance programs for NG and GTS replacement will be funded under the W88 enduring stockpile system, but actual replacement will be performed concurrently with the ALT operation. In November 2014, the NWC to replace the CHE on the W88, referred to as CHE Refresh. The CHE Refresh scope is included in the W88 Alteration Program and leverages existing tests to the maximum extent possible to minimize costs and reduce logistical impacts to the Navy. In February 2017, NNSA authorized the program to transition into Phase 6.4, Production Engineering. The FPU is scheduled for FY 2020.

W80-4 Life Extension Program

The W80-4 LEP will consider W80-based reuse, refurbishment, and replacement options for nuclear and non-nuclear components to provide a warhead for the Air Force LRSO cruise missile – the replacement for the current, aging Air-Launched Cruise Missile. The program will integrate the warhead with the replacement missile platform; address warhead component aging concerns, military requirements for reliability, service life, field maintenance, and surety. Key design requirements established for this LEP include using insensitive high explosives for the primary; maximizing use of common non-nuclear components, including common approaches from other designs such as the B61-12 and W88 Alteration Program; exploring options for enhanced surety; and parallel development with the Air Force on Warhead/Missile interface. In July 2015, the NWC authorized the program to transition into Phase 6.2, Feasibility Study and Option Down-select. The FPU is scheduled for FY 2025.

Activities and Explanation of Changes

FY 2016 Enacted	FY 2018 Request	Explanation of Changes FY 2018 vs FY 2016
B61-12 Life Extension Program $643,300,000	**B61-12 Life Extension Program $788,572,000**	**B61-12 Life Extension Program +$145,272,000**
• **System Engineering & Integration:** Conclude Phase 6.3 after completion of the System Baseline Design Review and the Air Force Preliminary Design Review and Acceptance Group (PDRAAG) Review. Analysis of system test results from FY 2013 through FY 2015 will be used for System Baseline Design Reviews in FY 2016. Following completion of these reviews, NNSA will authorize Phase 6.4 for the B61-12 LEP. Continue system design and integration of nuclear bomb components and the Air Force tail kit assembly in 2016 toward validating the final design in FY 2018, including assembly of functional compatibility test units for integration testing on required aircraft platforms. Continue work on NNSA and DOD trainers, including delivery of prototype trainers and associated handling gear and begin SS-21 (Seamless Safety for the 21st Century) production readiness activities at Pantex. • **Component Development & Production** Commence Phase 6.4 activities. Production Plants will continue procurement of tooling, testers, and materials and begin manufacturing production representative hardware to validate production processes. Process Prove-In (PPI) will begin for some bomb components, including firing, arming and safing components, nuclear explosives package components, limited life components, and use control components. • **System Testing & Qualification**: Continue system testing. Joint tests will integrate the NNSA bomb assembly and the Air Force tail kit assembly	• **System Engineering & Integration:** Phase 6.4 activities at the system-level will continue. The final design review, independent peer reviews, and system final design release are scheduled for completion. System design and integration of nuclear bomb components and the Air Force tail kit assembly will continue toward validating the final design, including assembly of functional Compatibility Test Units (CTUs) for integration testing on required aircraft platforms. NNSA will continue work on NNSA and DOD trainers, including delivery of prototype trainers and associated handling gear to be utilized for the creation of DOD maintenance technical publications. NNSA will also continue SS-21 production readiness activities at the Pantex Plant. • **Component Development & Production**: Phase 6.4 activities will continue for all major components. Production Plants will continue procurement of tooling, testers, and materials and will continue producing production representative hardware to validate and qualify production processes. The final components will be completing PPI, and Quality Evaluation (QE) will begin for some bomb components, including firing, arming and safing components, nuclear explosives package components, limited life components, and thermal batteries. • **System Testing & Qualification:** Conduct over 25 system-level joint, ground, and aircraft integration tests and conduct five system-level physics tests. Joint tests will begin gathering data	• The increase represents the acceleration of production activities at NSE sites to support a first production unit in FY 2020 and is consistent with the costs documented in the Baseline Cost Report. The increase enables procurement and qualification of production testers, tooling, and gages and manufacturing of production representative hardware to qualify production processes. Of the increase for the B61-12 since the FY 2017 Budget Request, $62 million represents an increase above the FY 2018 cost reported in the most recent SAR. This increase is based on the approved B61-12 LEP Baseline Cost Report, which was completed in 2016 and updates the previous program cost estimate reflected in the SAR. The B61-12 LEP total program cost increased 3.6% from the 2013 SAR to $7.6B. The increase in FY18 is due to LEP support activities being transferred to the B61-12 LEP and increased program costs at Pantex and Y-12.

FY 2016 Enacted	FY 2018 Request	Explanation of Changes FY 2018 vs FY 2016
utilizing final development hardware produced late in FY 2015 and delivered in FY 2016. The system testing will be used to validate the baseline design requirements established through early development testing and continue qualification testing for mechanical, thermal, and electrical environments. NNSA will also continue aircraft compatibility to assess integration with required aircraft platforms. LANL and SNL will continue to utilize modeling and simulation capabilities to support component and system design margin analysis.	to qualify the B61-12 utilizing production representative functional hardware produced in FY 2016 through FY 2018. The system testing will be used to assess and validate functional requirements and mechanical, thermal, and electrical environments in preparation of finalizing the system design in FY 2018 at the System Final Design Review. Aircraft compatibility will continue to assess integration with required aircraft platforms including continuing to conducting the system qualification drop tests. Continue to utilize modeling and simulation capabilities to support component and system design margin analysis	
W76-1 Life Extension Program $ 244,019,000	**W76-1 Life Extension Program $224,134,000**	**W76-1 Life Extension Program -$19,885,000**
• Perform Annual Assessment for the W76-1 LEP. • Continue efforts for improving the manufacturability of components and reducing costs. • Complete disassembly of W76-0 for the W76-1 LEP feedstock. • Complete Retrofit Evaluation System Tests (REST) of W76-1 LEP production components and war reserve hardware. • Complete production of replacement components destructively tested and rebuild of war reserve after REST and stockpile surveillance through the life of the program. • Continue the purchase of materials in economic lot sizes to reduce costs. • Perform purchases of vendor materials to support production rates contained in the Requirements and Planning Document (RPD) and schedules to meet the current deliverables in agreement with the Department of the Navy and	• Perform the Annual Assessment for the W76-1 LEP. • Continue disassembly of W76-0 for the W76-1 LEP hardware feedstock. • Perform purchases of vendor materials to support approved production rates. • Continue executing production builds at the approved rate and produce surveillance replacement components including NEP components, the AF&F assembly, 2X Acorn GTS, NG, as well as associated cables, elastomers, valves, pads, cushions, foam supports, telemetries, and miscellaneous parts aligned with the production schedule. • Meet the current deliverables in agreement with the Department of the Navy and in support of submarine deployment requirements. • Produce REST unique hardware required for testing.	• The decrease represents the completion of advanced procurements for some W76-1 LEP parts and materials.

FY 2016 Enacted	FY 2018 Request	Explanation of Changes FY 2018 vs FY 2016
in support of submarine deployment requirements. • Continue executing production builds at an approved rate and realign the production of replacement components with the production schedule, including Nuclear Explosive Package (NEP) components, and the AF&F assembly, 2X Acorn GTS, and NG, as well as associated cables, elastomers, valves, pads, cushions, foam supports, telemetries, and miscellaneous parts.	• Complete REST Surveillance of W76-1 LEP production components and war reserve hardware. • Complete production of surveillance replacement components destructively tested; rebuild war reserve after REST and stockpile surveillance through the life of the program.	
W88 Alteration Program $220,176,000	**W88 Alteration Program $332,292,000**	**W88 Alteration Program +$112,116,000**
• **System Engineering & Integration:** The majority of Phase 6.3 activities will conclude. The PDRAAG will be conducted in late FY 2016 to assess design and qualification against military requirements. Early Type 5 trainers will be produced to support production readiness at the Pantex Plant. • **Component Development & Production:** The majority of component qualification activities will conclude. For all major components and assemblies, including new AF&F Assembly, stronglinks, radar, firing subsystem, thermal batteries, impact fuze, launch accelerometer, lightning arrestor connector, and joint flight test assemblies. CHE Refresh components will complete FY 2016-planned qualification activities to support the overall W88 Alteration Program FPU. • **System Testing & Qualification:** Phase 6.3 development engineering activities continued with additional tests to integrate CHE Refresh NNSA. The System Baseline Design Review will be completed, which includes integration and qualification of the CHE Refresh. The Navy and NNSA will have completed a flight test of a JTA	• **System Engineering & Integration:** Phase 6.4 activities continue to mature production processes in preparation for production qualification and eventual war reserve production. The CHE refresh portion of the program is fully integrated including the addition of Hydro Tests. Design laboratories will generate final system-level production specifications for the Re-Entry Body and JTAs. Production authorization activities will continue to support production readiness and NESS. • **Component Development & Production:** Final component qualification activities will be conducted leading to Final Design Reviews for all major components, AF&F and at the RB-level. The production plants will be continuing or initiating Production PPI and begin the production process qualification for the ALT and CHE Refresh portions of the program. Long-lead purchases and assemblies will also continue and/or be initiated. Component testing and qualification activities for the CHE Refresh portion of the program will also continue.	• The increase represents Phase 6.4 activities associated with W88 Alteration Program and the incorporation of CHE Refresh as documented in the Baseline Cost Report which was completed in 2016 and updates the previous program cost estimate reflected in the SAR. The W88 Alteration Program total program cost increased 11% from the 2015 SAR to $2.6B. The increase in FY18 is largely due to increased scope in flight/ground qualification and additional testing at Los Alamos. • **System Engineering & Integration:** Increase in full scale system-level integration activities with CHE Refresh. Increase in system program management and controls including Earned Value Management system. Increase in Pantex War Reserve integration activities including facilities, SS-21, and other process development. • **Component Development & Production:** Additional production engineering activities associated with program transition into Phase 6.4.

FY 2016 Enacted	FY 2018 Request	Explanation of Changes FY 2018 vs FY 2016
body to fly on the Demonstration and Shakedown Operations (DASO)-26 mission. The Navy will complete the majority of functional and physical compatibility testing to certify the W88 Alteration Program with the Trident II D5 missile system. NNSA's design laboratories will complete planned modeling and simulations and analysis of tests.	• **System Testing & Qualification:** Although Phase 6.4 activities began in FY 2017, there are final activities under development engineering including the addition of tests to integrate CHE Refresh. NNSA will support the flight test program including testing a JTA on the Commander Evaluation Test (CET)-1. The design laboratories will continue modeling and simulations of the final system design that will be validated in ground tests as part of the overall system.	Addition of CHE final component design and development. Ramp up of pre-production activities to prepare for production which begins in FY 2018. A near-peak development activities with finalization and qualifications of component designs. • **System Testing & Qualification:** Addition of full suite of CHE Refresh qualification testing including LANL hydrodynamic tests. Increase in system testing and qualification with the W88 Alteration Program War Reserve and JTA. Addition of CHE Refresh scope into the nuclear system testing and qualification.
W80-4 Life Extension Program $195,037,000	**W80-4 Life Extension Program $399,090,000**	**W80-4 Life Extension Program +$204,053,000**
• Interface Control Documents (ICD) development will continue. Military Characteristics and Stockpile-to-Target Sequence continues to be refined. • Funding profile supports a FY 2025 FPU that enables the Phase 6.2 to be accelerated to meet the new FPU date for the program. • Continues in Phase 6.2 to identify and develop design options and compare design and manufacturability tradeoffs and life-cycle advantages and disadvantages with respect to reuse, refurbishment, and replacement; surety; military requirements for reliability, service life, and field maintenance; and warhead/missile integration. • Begin funding W80-4 specific technology maturation in areas not supported by other NNSA	• Publish a Phase 6.2A Report and Weapons Design and Cost Report. This report will document the conceptual designs, program costs, and schedules associated with the nuclear and non-nuclear refurbishment scope, including development of concepts and costs to be compatible with the Air Force's new LRSO Cruise Missile. The study will also evaluate options for improving safety and use control features and ensures compatibility and integration with aircraft.	• This increase in funding represents engineering activities required to perform parallel development and design activities with LRSO. These activities include hardware and prototype builds to support Joint Air Force/NNSA fit checks and environmental testing. The LRSO will enter its equivalent Phase 6.3 in FY 2018. NNSA must engage accordingly in FY 2018, although still in Phase 6.2A. This funding is required to maintain schedule alignment with the Air Force LRSO. • The increase will support growth in staffing for the PRT at laboratories and production facilities across the nuclear enterprise to conduct development activities for the program. The increase is offset by a decrease resulting from a change in pension strategy.

FY 2016 Enacted	FY 2018 Request	Explanation of Changes FY 2018 vs FY 2016
programs. Efforts will focus on the development of technologies and components that support design options in accordance with draft military characteristics. Technology maturation and component development will be completed in an accelerated mode to meet the W80-4 FPU. • Begin development of program control processes and supply chain management. • FY 2016 was first year of Phase 6.2. This funding will enable the first step increase in staffing for engineering, PRTs, and program management.		• The funding also supports increased staffing for engineering development activities commencing FY 2018. Design Definition and Phase 6.3 work. Engineering development activities include technology maturation and design option development and analysis to prepare a final design recommendation to the NWC in FY 2018.

Directed Stockpile Work
Stockpile Systems

Description

Stockpile Systems directly executes sustainment activities for the total (active and inactive) stockpile for the B61, W76, W78, W80, B83, W87, and W88 weapons. As required by 50 United States Code 2525, safety, security, and effectiveness assessments are performed to determine whether the systems can continue to be certified without the need of an underground nuclear test. Sustainment activities for each weapon system are identified by four major subprograms that support the enduring stockpile system, as well as LEPs and ALTs:

Current U.S. nuclear weapons and associated delivery systems

Warheads—Strategic Ballistic Missile Platforms					
Type [a]	***Description***	***Carrier***	***Laboratories***	***Mission***	***Military***
W78	Reentry vehicle warhead	Minuteman III Intercontinental Ballistic Missile	LANL/SNL	Surface to surface	Air Force
W87	Reentry vehicle warhead	Minuteman III Intercontinental Ballistic Missile	LLNL/SNL	Surface to surface	Air Force
W76-0/1	Reentry body warhead	Trident II D5 Strategic Weapon System (Submarine Launched Ballistic Missile)	LANL/SNL	Underwater to surface	Navy
W88	Reentry body warhead	Trident II D5 Strategic Weapon System (Submarine Launched Ballistic Missile)	LANL/SNL	Underwater to surface	Navy
Bombs—Aircraft Platforms					
Type [a]	***Description***	***Carrier***	***Laboratories***	***Mission***	***Military***
B61-3/4/10	Non-strategic bomb	F-15, F-16, certified NATO aircraft	LANL/SNL	Air to surface	Air Force/ Select NATO forces
B61-7	Strategic bomb	B-2 bomber	LANL/SNL	Air to surface	Air Force
B61-11	Strategic bomb	B-2 bomber	LANL/SNL	Air to surface	Air Force
B83-1	Strategic bomb	B-2 bomber	LLNL/SNL	Air to surface	Air Force
Warheads—Cruise Missile Platforms					
Type [a]	***Description***	***Carrier***	***Laboratories***	***Mission***	***Military***
W80-1	Air-launched cruise missile strategic weapon	B-52 bomber	LLNL/SNL	Air to surface	Air Force

LANL = Los Alamos National Laboratory
LLNL = Lawrence Livermore National Laboratory
NATO = North Atlantic Treaty Organization
SNL = Sandia National Laboratories
[a]The suffix associated with each warhead or bomb type (*e.g.*, "-0/1" for the W76) represents the modification associated with the respective weapon.

Stockpile Systems Major Activity Levels:

(1) Weapon Maintenance: Includes production of LLCs that include GTS, NGs, and other designated components as required in accordance with National Requirements Documents and/or Directive Schedules, day-to-day stockpile maintenance and repair activities, production and delivery of components for each weapon type, refurbishment and replacement of aging components to sustain stockpile life, and rebuilds.

(2) Weapon Surveillance: Includes new material laboratory and flight tests, retrofit evaluation system laboratory and flight tests, stockpile laboratory tests, stockpile flight tests, quality evaluations, special testing, and component and material evaluation to support assessment of the safety, security, and effectiveness of the nuclear weapons stockpile. Data from these tests contributes to the Annual Assessment and memorandum to the President.

(3) Weapon Assessment and Support: Includes activities associated with management of fielded weapon systems. Provides systems and component engineering support, support to planning, resolution, and documentation of SFIs to include assessment of root cause, extent of conditions, and impact to system effectiveness or safety. Also includes activities associated with planning, developing, and updating the technical basis for the materials, components, and weapons and performing the weapon assessments. Finally, activities associated with preparation, writing, and coordination of Annual Assessment Reports (AARs) and Weapon Reliability Reports and activities needed to assess/resolve system-specific weapon response issues and to provide support to the Nuclear Explosive Safety Study Groups (NESSG) and the Nuclear Weapon System Surety Groups (NWSSG) as required, are included.

(4) Development Studies/Capability Improvements: Includes activities associated with improvements in surveillance capabilities, technical basis improvements, technology maturation for insertion or replacement, and system/surety studies.

Stockpile Systems Description
B61 Stockpile Systems

The B61 gravity bombs are the oldest weapons in the enduring stockpile. The B61 is deployed by the Air Force on various aircraft. The B61 family includes five modifications with two distinct categories. The strategic category includes the B61 Modifications -7 and -11, with Modification-11 being the only active earth penetrating weapon. The non-strategic category includes the B61 Modifications -3, -4, and -10 supporting our extended nuclear commitment.

W76 Stockpile Systems

The W76-0 and W76-1 LEP is the warhead integrated into the Trident II D5 Strategic Weapon System. It is part of the SLBM force. The W76-0/Mk4 and W76-1/Mk4A is completed by NNSA as a Reentry Body Assembly and delivered to DOD.

W78 Stockpile Systems

The Mk12A/W78 re-entry vehicle is deployed on the Minuteman III ICBM.

W80 Stockpile Systems

The W80 warhead is used in the Air Launched Cruise Missile deployed by the Air Force.

B83 Stockpile Systems

The B83 is an aircraft delivered, strategic gravity bomb deployed by the Air Force.

W87 Stockpile Systems

The Mk21/W87 re-entry vehicle is deployed on the Minuteman III ICBM.

W88 Stockpile Systems

The W88 is integrated into the Trident II D5 Strategic Weapon System. It is part of the SLBM force. The W88/Mk5 is completed by NNSA as a Reentry Body Assembly and delivered to DOD.

Stockpile Systems

Activities and Explanation of Changes

FY 2016 Enacted	FY 2018 Request	Explanation of Changes FY 2018 vs FY 2016
B61 Stockpile Systems $52,247,000	**B61 Stockpile Systems $59,729,000**	**B61 Stockpile Systems +$7,482,000**
• **Weapon Maintenance:** Continue to produce LLCs. Continue Electronic Neutron Generator (ELNG) development and qualification activities to achieve a FPU for the B61-11 in FY 2019. • **Weapon Surveillance:** Continue surveillance activities, including, but not limited to: disassembly and inspections, system-level laboratory tests, joint flight tests, component and material evaluations, and assessment. • **Weapon Assessment and Support:** Continue weapon assessment activities necessary to complete WRR and AAR Reports, which include: laboratory testing and analysis, and significant finding investigations as required. • **Development Studies/Capability Improvements:** Continue design activities for the Electronic NG. Continue feasibility studies as required and in conjunction with the DOD as necessary.	• **Weapon Maintenance:** Continue to produce LLCs. Continue ELNG development and qualification activities to achieve FPU for the B61-11 in FY 2019. • **Weapon Surveillance:** Continue surveillance activities, including D&I, system-level laboratory tests, joint flight tests, component and material evaluations, and assessment. • **Weapon Assessment and Support:** Continue weapon assessment activities necessary to provide data for WRRs and AARs, which include analyses from laboratory testing and SFIs, as required. • **Development Studies/Capability Improvements:** Continue development activities for the ELNG for the B61-11. Perform development and qualification activities to support ISA requirements. Continue feasibility studies as required and in conjunction with DOD as necessary.	• The increase represents a $1,069,000 increase in Weapons Surveillance for component testing to meet the approved baseline, and a $6,413,000 increase in Development Studies/Capability Improvements reflects ISA requirements.
W76 Stockpile System $50,921,000	**W76 Stockpile System $51,400,000**	**W76 Stockpile Systems +$479,000**
• **Weapon Maintenance:** Continue to produce LLCs, and increase production plant support for GTS. • **Weapon Surveillance:** Conduct W76-0 and W76-1 LEP surveillance to include D&I, system-level laboratory and joint flight testing, increase in component testing at Y-12 and LANL, component and material evaluations (CME), and platform compatibility and testing activities.	• **Weapon Maintenance:** Continue producing LLCs, which include an increase in NG/GTS production. • **Weapon Surveillance:** Conduct W76-0 and W76-1 core surveillance activities to include: D&I, system-level laboratory and joint flight testing, W76-1 LEP requirements continue to transition from the LEP to stockpile systems. • **Weapon Assessment and Support:** Continue to conduct weapon assessment activities necessary to complete Weapon Reliability and AARs to	• The increase represents a $3,246,122 Weapon Maintenance increase in the NG/GTS cost due to high fidelity estimates for next limited life component exchange (LLCE) cycle; a $1,773,466 increase in Weapon Surveillance due to W76-1 requirements transitioning from LEP to Stockpile Systems consistent with the approved baseline; a $1,163,596 decrease in Weapon Assessment and Support due to realignment of laboratory personnel against specific maintenance and

FY 2016 Enacted	FY 2018 Request	Explanation of Changes FY 2018 vs FY 2016
• **Weapon Assessment and Support:** Continue to conduct weapon assessment activities necessary to complete WRR and AARs Reports to include laboratory/site testing and analysis, trainer refurbishments, and SFIs. • **Development Studies/Capability Improvements:** Provide laboratory and management expertise to Project Officers Group (POG) and DOD Safety Studies.	include laboratory/site testing and analysis, trainer refurbishments, and SFIs. W76-1 LEP requirements continue to transition from the LEP to stockpile systems. • **Development Studies/Capability Improvements:** Provide laboratory and management expertise to POG and DOD Safety Studies. Also limited development for Joint Test Assembly Refresh.	surveillance activities; and a $3,376,992 decrease in Development Studies/Capability Improvements due to realignment of laboratory personnel against specific maintenance and surveillance activities
W78 Stockpile Systems $64,092,000	**W78 Stockpile Systems $60,100,000**	**W78 Stockpile Systems -$3,992,000**
• **Weapon Maintenance:** Achieve weapon repair FPU, continue maintenance activities and replacement of aging components as required. • **Weapon Surveillance:** Continue surveillance activities include but not limited to disassembly and inspections, system-level laboratory tests, joint flight testing, component and material evaluations, and assessment. • **Weapon Assessment and Support:** Continue weapon assessment activities necessary to complete WRR and AAR, to include laboratory testing and analysis and SFI as required. • **Development Studies/Capability Improvements:** Conduct feasibility studies as required and in conjunction with the DOD as necessary.	• **Weapon Maintenance**: Conduct maintenance activities in accordance with program control documents (PCDs) and execute repair and replacement of aging components as required. • **Weapon Surveillance:** Continue to conduct surveillance activities in accordance with directive documents, to include D&I's, system-level laboratory tests, joint flight testing, component and material evaluations and assessment. • **Weapon Assessment and Support:** Continue weapon assessment activities necessary to complete Weapon Reliability and AAR's to include laboratory testing and analysis, SFI's as required. Also to include one Hydro test. • **Development Studies/Capability Improvements:** Conduct studies in conjunction with DOD as necessary. Assess impact and alternative options for obsolescence of JTA sunset technology and impact to flight test missions.	• The decrease represents a $607,381 decrease in Weapon Maintenance due to a decrease in NG's, GTS production and weapon repair start-up costs/authorization; a $2,310,899 decrease in Weapon Surveillance for component and flight testing consistent with the approved baseline; a $5,393,699 decrease in Assessment and Support for technology basis and aging studies; and a $4,319,979 increase in Development Studies to assess impact and alternative options for obsolesce of JTA sunset technology and impact to flight test missions.
W80 Stockpile Systems $68,005,000	**W80 Stockpile Systems $80,087,000**	**W80 Stockpile Systems +$12,082,000**
• **Weapon Maintenance:** Continue to produce LLCs. Continue W80 NG qualification activities in support of FPU. Continue ALT 369 and D&I	• **Weapon Maintenance:** Continue to produce LLCs and complete ALT 369 activities to achieve FPU in 1Q FY 2018.	• The increase represents a $3,450,000 increase in Maintenance to support W80-1 ALT 369 1Q FY18 FPU which was delayed from April 2017 and

FY 2016 Enacted	FY 2018 Request	Explanation of Changes FY 2018 vs FY 2016
Authorization Basis (AB) activities in support of a W80-1 ALT 369 FPU. • **Weapon Surveillance:** Continue surveillance activities to include but not limited to: D&I, system-level laboratory and joint flight testing, joint flight testing, component and material evaluations, assessment, and platform compatibility and testing activities. • **Weapon Assessment and Support:** Continue weapon assessment activities necessary to complete WRR and AAR, which include: laboratory testing and analysis, and significant finding investigations as required. • **Development Studies/Capability Improvements:** Continue development activities for the Small Ferroelectric NG. Conduct feasibility studies as required in conjunction with the DOD, as necessary.	• **Weapon Surveillance:** Continue surveillance activities, to include D&I, system-level laboratory and joint flight testing, CME, assessment, and platform compatibility and testing activities. • **Weapon Assessment and Support:** Continue weapon assessment activities necessary to complete WRRs and AARs, which include analyses of laboratory testing and SFIs, as required. • **Development Studies/Capability Improvements:** Conduct appropriate feasibility studies in conjunction with DOD and provide laboratory and management expertise to the POG and DOD Safety Studies. Perform development and qualification activities to support ISA requirement.	continued production; a $2,682,000 increase in Assessment and Support for material evaluations, model development and analysis; a $4,033,000 decrease in Development Studies/Capability Improvements to support NG development and qualification activities; and a $9,983,000 increase in Development Studies/Capability Improvements that reflects ISA requirements.
B83 Stockpile Systems $42,177,000	**B83 Stockpile Systems $35,762,000**	**B83 Stockpile Systems -$6,415,000**
• **Weapon Maintenance:** Continue to support LLCE operations. • **Weapon Surveillance:** Continue surveillance activities, including, but not limited to: D&I, system-level laboratory tests, joint flight tests, component and material evaluations, and assessment. • **Weapon Assessment and Support:** Continue weapon assessment activities necessary to complete WRR and AAR. • **Development Studies/Capability Improvements:** No activities planned.	• **Weapon Maintenance:** Continue to support LLCE operations • **Weapon Surveillance:** Continue surveillance activities, including D&Is, system-level laboratory tests, joint flight tests, CMEs, and assessment. • **Weapon Assessment and Support:** Continue weapon assessment activities necessary to complete WRRs and AARs, to include analyses of laboratory testing and SFIs, as required. • **Development Studies/Capability Improvements:** No activities planned.	• The decrease represents a $2,639,669 decrease in Weapon Maintenance due to deferral of both the gas transfer system and neutron generator replacements; a $2,275,331 decrease in Weapon Surveillance for early completion of CSA evaluation activities, a delay in pit surveillance activities, and reduced activities as a result of deferral of the JTA Sustainment project; and a $1,500,000 decrease in Weapon Assessment and Support as a result of the reduction in evaluation activities and completion of SFIs.
W87 Stockpile Systems $89,299,000	**W87 Stockpile Systems $83,200,000**	**W87 Stockpile Systems -$6,099,000**
• **Weapon Maintenance:** Continue NG production, firing set qualification and FPU activities.	• **Weapon Maintenance:** Continue NG production, firing set qualification and first production unit	• The decrease represents a $1,803,745 decrease in Weapon Maintenance for firing set rebuilds

FY 2016 Enacted	FY 2018 Request	Explanation of Changes FY 2018 vs FY 2016
Continue to produce LLCEs; and execute repair, maintenance, and replacement of aging weapon components. • **Weapon Surveillance:** Continue surveillance activities include disassembly and inspection, system-level laboratory and joint flight testing, component and material evaluations, and platform compatibility and testing activities. In addition, Retrofit Evaluation System Tests for the W87 LLCE and Firing Set Rebuilds will continue. • **Weapon Assessment and Support:** Continue weapon assessment necessary to complete Weapon Reliability and Annual Assessment Reports, to include: laboratory/site testing and analysis, POG and DOD safety studies, and SFIs. • **Development Studies/Capability Improvements:** Continue product realization activities for W87 ALT 360. Continue feasibility studies as required in conjunction with the Department of Defense.	activities. Continue to produce LLC's, and execute repair, maintenance and replacement of aging weapon components. Continue activities for qualification of GTS ALT 360 with an FPU in FY 2019. Continue firing set development and qualification activities with FPU in FY 2019. • **Weapon Surveillance:** Continue surveillance activities to include: D&I, system-level laboratory and joint flight testing, component and material evaluations, and platform compatibility and testing activities. • **Weapon Assessment and Support:** Continue weapon assessment necessary to complete WRR and AAR, to include: laboratory testing and analysis, Project Officer Group and Department of Defense requested studies, and SFIs. • **Development Studies/Capability Improvements:** Continue product realization activities for the W87 ALT 360. Continue feasibility studies as required in conjunction with the DOD.	and GTS production; a $578,981 increase in Weapon Surveillance attributed to component testing and fulfillment of flight testing requirements; a $3,094,562 decrease in Assessment and Support for technology basis and aging studies; and a decrease of $1,779,674 in Development Studies for ALT 360 development activities.
W88 Stockpile Systems $115,685,000	**W88 Stockpile Systems $131,576,000**	**W88 Stockpile Systems +$15,891,000**
• **Weapon Maintenance:** Continue to execute repair, maintenance, and replacement of aging weapon components. Continue development activities to achieve full scale NG production in FY 2019, NG PPI, and design and qualification activities for the next generation GTS supporting Limited LLCEs beginning in FY 2020. • **Weapon Surveillance:** Continue surveillance activities to include: Disassembly and Inspection, system-level laboratory and joint flight testing, CME, and platform compatibility and testing activities. • **Weapon Assessment and Support:** Continue weapon assessment activities necessary to	• **Weapon Maintenance:** Continue to execute production of weapon components required for repair, maintenance, and replacement. Continue production and qualification activities to achieve full-scale NG production in FY 2019. Continue production and qualification activities for the GTS support LLCE beginning in FY 2020. Rebuild warheads only to maintain authorization basis due to W88 Alteration Program preparation, and begin ALT 940 production activities. • **Weapon Surveillance:** Continue surveillance activities to include D&I, system-level laboratory and joint flight testing, CME, and platform compatibility and testing activities. Increased	• The increase represents a $440,844 increase in Weapon Maintenance for production of ALT 940 ISA hardware; a $2,221,814 increase in Weapon Surveillance due to more activity in support of W88 Alteration Program to include Canned Subassembly nondestructive evaluations; a $2,701,412 increase Weapon Assessment and Support due to assessment activity in support of W88 Alteration Program production; and a $10,526,930 increase in Development Studies/Capability Improvements due to ALT 940 (ISA).

FY 2016 Enacted	FY 2018 Request	Explanation of Changes FY 2018 vs FY 2016
complete Weapon Reliability and AARs, to include laboratory/site testing and analysis, trainer refurbishments, and SFIs. • **Development Studies/Capability Improvements:** Continue critical Development/Integration and start System-level qualification activities for surety enhancements, including surety implementation, and replace legacy W88 System NG and GTS. Conduct appropriate studies in conjunction with the DOD; provide laboratory and management expertise to the POG and DOD Safety Studies.	component surveillance activities, to include Canned Subassembly non-destructive evaluations. • **Weapon Assessment and Support:** Continue weapon assessment activities necessary to complete Weapon Reliability and AARs, to include laboratory/site testing and analysis, trainer refurbishments, and SFIs. Continue the CASTLE transition program started in FY 2016 which includes a NESS that will enable the system to continue Pantex operations. Decreased assessment activity in anticipation of W88 Alteration Program fielding. • **Development Studies/Capability Improvements:** Continue critical Development/Integration and start system level qualification activities for surety enhancements, and replace legacy W88 System NG and remanufacture of GTS. Conduct appropriate studies in conjunction with DOD; provide laboratory and management expertise to the POG and DOD safety studies. Continue ALT 940 surety implementation and begin H1514 shipping container refurbishment.	

Directed Stockpile Work
Weapons Dismantlement and Disposition

Description

Weapons Dismantlement and Disposition (WDD) is a critical element of NNSA's integrated effort to transform the enterprise and the stockpile. Specific activities include weapons disassembly, harvesting of material and hardware for LEPs, disposition of retired warhead system components, and safety surveillance of selected components from retired warheads. Other supporting activities specific to retired warheads include conducting hazard assessments, issuing safety analysis reports, conducting laboratory and production plant safety studies, and declassification and sanitization of component parts. WDD relies on several enabling programs to complete its mission, such as Stockpile Services Production Support for shipping, receiving, and equipment maintenance; Infrastructure and Operations for infrastructure sustainment and containers; and the Office of Secure Transportation for movement of weapons and weapon components.

WDD focuses on the safe and secure dismantlement of excess nuclear weapons and components. The WDD program has four focus areas:

Disassembly – WDD enables the dismantlement of weapons and canned subassemblies and is a significant supplier of material for future nuclear weapons production.

Component Disposition – WDD program begins the process of component disposition by ensuring waste streams are identified for the permanent disposition of weapon components.

Retired Systems Management – WDD enables safety studies that are needed to ensure weapons in the stockpile awaiting dismantlement remain safe while in DOD custody.

Component Characterization – WDD program ensures that all hazards in weapon parts are characterized so the weapons complex can safely work with individual weapon components.

Weapons Dismantlement and Disposition

Activities and Explanation of Changes

FY 2016 Enacted	FY 2018 Request	Explanation of Changes FY 2018 vs FY 2016
Weapons Dismantlement and Disposition (WDD) $52,000,000	**Weapons Dismantlement and Disposition (WDD) $52,000,000**	**Weapons Dismantlement and Disposition (WDD) $0**
• Pursue a balanced approach to dismantling warheads and CSAs. • Y-12 will dismantle CSAs as feedstock for internal and external customers (e.g. Naval Reactors). • Pantex will dismantle weapons such that material and component requirements are met (e.g., W80-1 ALT 369 and W76-1 LEP). • Y-12 will receive CSAs to sustain the Pantex dismantlement line. • KCNS and Savannah River will continue annual disposition activities. • The design laboratories will provide technical expertise for systems undergoing dismantlement and will refine safety test plans for systems in retirement. • Enterprise sites will disposition legacy components.	• Pantex will dismantle weapons such that material and component requirements are met (e.g., W80-1 ALT 369 and W76-1 LEP) while progressing towards NNSA's goal to complete dismantlement of the quantity of weapons retired prior to FY 2009 by FY 2022. • Y-12 will receive CSAs to sustain the Pantex dismantlement line while providing feedstock to internal and external customers (e.g. Naval Reactors). • The laboratories will provide technical expertise and safety plans for weapons undergoing dismantlement. • Enterprise sites will continue legacy component disposition activities	• The level funding represents the funding required to meet NNSA's goal to dismantle the quantity of weapons retired prior to FY 2009 by FY 2022, eliminating the planned acceleration stated in the FY 2017 budget request.

Directed Stockpile Work
Stockpile Services

Description

Stockpile Services provides the logistical, mechanical, and support foundation for all DSW operations that are applicable to multiple weapon systems in the nuclear weapons stockpile. This support for all weapon systems and continued sustainment for all DSW operations includes Production Support and R&D Support, essential for plant and laboratory critical skills, programmatic and infrastructure management, liaison support between the laboratories and production plants, material, quality controls, and surveillance and evaluation activities for the nuclear weapon stockpile; R&D Certification and Safety (RDCS), focusing on the early development of components to replace sunset technologies, new engineering models and algorithms, design studies with the objective of advancing technologies sufficiently to be adopted for future insertions, conducting scaled demonstrations of technologies anticipated for insertion into the stockpile, and processing and qualifying replacement components for the existing stockpile; and Management, Technology, and Production, which provides stockpile sustainment services including products, components, and/or services for multi-weapon surveillance, weapons reliability reporting to DOD, weapon logistics and accountability, and maintenance and/or replacement of weapons related equipment.

Production Support

Production Support is the backbone for the manufacturing capability of the stockpile and includes multi-system manufacturing based program activities that provide the individual site capability and capacity to sustain the nuclear security enterprise's production mission. The production mission is defined as weapon assembly, weapon disassembly, component production, surveillance, and weapon safety and reliability testing. Production Support also enables the modernization of production capabilities to improve efficiency and ensure manufacturing operations meet future requirements. Production Support requires close coordination with the Component Manufacturing Development (CMD) activity under the Advanced Manufacturing Development program, which is charged with development and initial deployment of new manufacturing and production capabilities.

The Production Support mission scope includes:

(1) Engineering Operations – Internal plant-wide activities that establish product process flows and improvements, develop and maintain operating procedures, determine critical design parameter and manufacturing process capabilities, establish process controls, metrics and quality indices, and establish and maintain process safety controls/assessments;
(2) Manufacturing Operations – Activities that manage and provide oversight to manufacturing departments and all internal non-weapon-type specific manufacturing operations and processes, material controls, supervision, planning and scheduling, inventory control, packaging, shipping and procurement, internal production-related transportation, and internal production related safety activities. It also includes classified manufacturing operations that cannot be associated with a particular warhead;
(3) Quality, Supervision, and Control – Includes activities dealing with quality control, supervision of general in-line inspection and radiography, procedures development and execution, process control certification for War Reserve products, measurement standards and calibration techniques, calibration of equipment, tooling, gages and testers, and Quality Assurance (QA)-related equipment/processes for certification;
(4) Tool, Gage, and Equipment Services – Activities that include preparation of specifications and designs for non-weapon-type specific tooling including tools, gages, jigs and fixtures and test equipment, as well as design and development of tester software including tester control and product assurance. This category also includes work related to verification/qualification of hardware and software, procurement processes, and maintenance both corrective and preventative that directly support production-related equipment/process components;
(5) Purchasing, Shipping, and Materials Management – Planning, engineering, supplier management, and logistics activities associated with the materials supply chain; and
(6) Electronic Product Flow – Activities that include internal plant-wide purchase, design, development, installation, configuration, testing, training, and maintenance of classified and unclassified computer systems including hardware and software directly linked to the performance of site-specific production functions, but are separate and distinct from general-use administrative/office automated systems.

<u>Research and Development (R&D) Support</u>

The R&D Support Program is responsible for the programmatic and infrastructure management supporting multiple-system stockpile activities critical to DSW programs. Direct support to activities includes multiple-system flight tests, archiving of weapons data required to validate and verify computational and predictive methods without the use of underground tests, updating R&D and engineering tools to remain current with evolving technology, computer system support and cyber security compliance, quality assurance, securing databases for Joint Integrated Lifecycle Surety (JILS) activities, and liaison support between design laboratories and production plants. These endeavors support multiple systems in the existing stockpile and reduce multi-faceted risks that can affect operations and procedures for these systems.

The R&D Support mission scope includes:

(1) R&D Infrastructure Support – Addresses internal laboratory work that maintains the technical and scientific base including equipment, staff, and facilities. Specific activities include maintaining and upgrading computation/simulation systems and licenses, developing R&D staff with the technical skills and knowledge required to be proficient at core product testing and experimentation, and applying any tax that may be levied on an R&D program for building and capital use.
(2) Program Management and Integration for R&D Activities – Includes maintaining financial databases, milestone tracking, risk analyses, and R&D support for the POG and NWSSG. Specific activities include overseeing aspects of DSW Program Management, assigning R&D laboratory personnel/assignees to external/offsite federal organizations, and managing and executing R&D support service contracts.
(3) Laboratory Research and Development Support to the Production Plants – Covers laboratory work required to support the production plants' R&D activities.
(4) Quality Control for Research and Development – Ensures that quality control procedures, methods, and processes are implemented in R&D activities.
(5) Joint Integrated Lifecycle Surety (JILS) – Provides support to assess weapon-venue specific challenges and recommends solutions to improve safety and security issues in conjunction with the weapon systems groups. JILS maintenance consists of database administration and the upkeep of the hardware and software required to maintain normal operations of the tool.
(6) Nuclear Testing Heritage (NTH) – Funds general and non-nuclear test readiness through advanced scientific and technology development and preparedness to perform a nuclear test should the President deem it necessary. NTH supports legacy commitments at NNSS by maintaining the Nuclear Testing Archive, and funding groundwater protection programs, and seismic monitoring. It also funds efforts to preserve nuclear test data at the design laboratories.

<u>Research and Development Certification and Safety (RDCS)</u>

RDCS provides the fundamental engineering and applied R&D infrastructure critical for safe, responsible, and efficient stockpile stewardship. In carrying out these responsibilities, RDCS supports the core competencies and expertise, personnel, and technologies essential for maintaining reliable and operable stewardship capabilities and performs the development, engineering, and integration of technologies that improve capability in the areas of safety, reliability, and performance of multiple weapon systems in the enduring stockpile. RDCS addresses and resolves current and emerging stockpile issues, to include early development of components to replace sunset technologies, new engineering models and algorithms, and design studies with the objective of advancing technologies for adoption by future systems. The RDCS program also conducts scaled demonstrations of technologies anticipated for insertion into the stockpile and systems engineering training exercises. Conducted primarily by the national laboratories and supported by the production sites, the RDCS scope of responsibilities includes (1) Weapon Component Development (WCD), (2) Joint Technology Demonstrator (JTD) (3), Applied R&D Studies, including support for the annual assessment of the U.S. stockpile, (4) Base Hydrodynamic and Subcritical Experiments, (5) Dynamic Plutonium Experiments, and (6) oversight of DOE and DOD collaborations.

The RDCS mission scope includes:

(1) Weapon Component Development (WCD) – Activities associated with the development, engineering, and integration of technologies that ensure the successful (authorized) use, safety, and handling of each system present in the modern stockpile. WCD oversees the early-stage development and testing of all weapon components targeted to replace sunset technologies and modernize subsystems, defined as components facing performance, aging, and/or security issues that can have negative impacts on the performance and safety of a weapon. Failure to support these activities will increase risk, cost, and uncertainty in the operations, maintenance, and safety of current and future stockpile systems.

Moreover, WCD investment avoids loss of expertise and knowledge necessary to sustain these activities. Weapon component technologies supported by RDCS include:

- **Gas Transfer Systems (GTS):** Activities associated with enhancing the design and capabilities of LLCs to offset weapon aging and uncertainty issues.
- **Detonators:** Activities required for continual development and improvements associated with detonator technologies to offset aging effects and sunset technologies and to take advantage of new technologies that enhance safety and reliability.
- **Neutron Generators (NGs):** Activities required for continual development and improvements associated with NG technologies to offset aging effects including components and materials, and development and qualification of improved radiation-hardened (rad-hard) ferro-electric and ELNG designs.
- **Arming, Fuzing & Firing (AF&F):** Required R&D activities needed to upgrade arming, fuzing, and firing subsystems that incorporate trusted microelectronics, control systems, and additional features, including new architectures that enhance agility, adaptability, and modularity.
- **Nuclear Explosives Package (NEP) and Related Components:** R&D activities in support of technologies required for next generation components and materials required to ensure safety, security, reliability, and performance of the aging NEPs of the enduring stockpile. Includes investigations into high explosive (HE) initiation dynamics, reformulation and understanding of the characteristics of legacy HE, and the development of new HE formulations and materials and initiation methods.
- **System Engineering and Integration:** Activities required to ensure integration of system concepts and revised architecture engineering for the existing stockpile. This includes performing future tactical and strategic weapon system planning, concept development, and coordination with weapon component development organizations and R&D capabilities to facilitate maturation of key technologies to support future tactical and strategic weapon system LEP insertions.

(2) Joint Technology Demonstrator (JTD) – The JTD is a U.S./UK strategic collaboration dedicated to the design and development of a series of joint integrated system demonstrations supporting new safety, security, and advanced manufacturing technologies. A goal of the JTD collaboration is to sustain core capabilities throughout the U.S. and UK nuclear weapons enterprise in the design, manufacture, ground testing, and assembly of flight-ready hardware. The collaboration will exercise and mature capabilities in nuclear weapon science, component and subsystem technologies, cost and time-efficient production methods, and systems integration, and seeks to reduce future programmatic risk, development and technology insertion time, and life cycle costs. These efforts target the highest risk capabilities and technologies required to minimize the risk to future weapon development activities, and so has a nearer term focus than that of the Stockpile Responsiveness Program within the Research, Development, Test and Evaluation portfolio; it does not exercise all capabilities in all phases of the weapon lifecycle due to limited resources.

(3) Applied Research and Development (R&D) Studies – Applied R&D includes establishing system-level context and associated requirements for fundamental technology development, weapon certification and safety processes, weapons effects assessments, and vulnerability studies. Specific applications include: Independent Nuclear Weapons Assessment (INWAP): Activities associated with planning, data exchange and conducting cross laboratory assessments of weapons in the active stockpile. INWAP is tied to the Annual Assessment process via 50 United States Code 2525.

- Weapons Effects Studies: Weapons effects studies not covered by the Nuclear Survivability subprogram of the Engineering program.
- Vulnerability Studies: Studies associated with evaluating weapon-related vulnerabilities, leading to prioritized investments for risk mitigation.
- Weapon System Architecture Studies: Activities associated with defining system architectures to support future life extension and ALT programs, which improve surety and performance, reduce lifecycle costs, and provide the framework for fundamental technology development.
- Primary and Secondary Assessments: Activities associated with conducting annual assessment and certification of weapon primaries and secondaries.
- Chemistry and Material Science Assessments: Activities associated with conducting chemistry and materials science assessments related to NEPs.

- NEP System Analyses: Activities associated with developing new NEP technologies and methodologies that ensure compatibility with integrated micro-electronic systems.

(4) Base Hydrodynamic and Subcritical Experiments: Includes activities required to ensure the base hydro capability is available to support experiments across multiple systems and system level experiments; activities associated with maintaining the hydrodynamic material control program in support of scheduled multiple systems experiments and tests; activities associated with designing, preparing, and assembling test components for multiple systems base hydrodynamic experiments and sub-critical tests experiments; activities associated with providing inputs and updates to the National Hydro Test Plan for multiple systems; activities associated with conducting and analyzing results of hydrodynamic experiments and sub-critical tests across multiple systems; and activities associated with conducting and analyzing results of hydrodynamic experiments for certifying LEPs.

(5) Dynamic Plutonium Experiments (DPE): Includes activities to ensure the DPE events are conducted as scheduled in support of multiple systems and technology base; activities required to ensure the base DPE capability is available to support experiments across multiple systems and system level experiments; activities associated with designing, preparing, and assembling test components for multiple systems of dynamic plutonium experiments; activities associated with providing inputs and updates to the DPE Test Plan for multiple systems; and activities associated with conducting and analyzing results of dynamic plutonium experiments.

(6) Department of Defense/Department of Energy Memorandum of Understanding (DOD/DOE MOU): Includes development activities supporting agreed-upon DOD/DOE joint munitions studies under the current MOU.

Management, Technology, and Production (MTP)

The MTP program is a multi-system production based program that enhances nuclear security enterprise integration and efficiency. MTP funding is used to provide plant and laboratory personnel to help sustain the stockpile, including activities relating to surveillance laboratory/flight test data collection and analysis; weapons reliability reporting to the DOD; weapon logistics and accountability; engineering authorizations; safety assessments; Use Control technologies used to keep weapons safe, secure, and available to the war fighter upon Presidential release authority; base spares used to sustain weapons in a safe reliable status; studies evaluating nuclear weapon operations safety; weapon components for use in multiple weapons systems; multi-weapon system transportation/handling gear/containers used to safely and securely store and transport weapons between DOD and DOE sites; and stockpile planning. MTP provides a coordinated enterprise wide product realization enterprise approach for weapon design and information systems used for weapon stockpile accountability reporting used to report quantities, values, and status to Congress.

The MTP mission scope includes:

(1) Product Realization Integrated Digital Enterprise (PRIDE): Operation and maintenance of 44 classified electronic information management systems required to share information in a secure manner across the nuclear security enterprise on weapons design, manufacturing, surveillance, and weapons accountability;
(2) Weapons Training and Military Liaison: Staffing the multi-weapon subject matter experts for Unsatisfactory Reports (URs) associated with DOD's field issues for testing and handling gear, Technical Publications, and coding issues that allows maintenance operations to return weapons back to active status. Additionally, this activity sustains critical manufacturing skills required at enterprise sites;
(3) Studies and Initiatives: Activities that re-establish critical depleted uranium-related capabilities including skilled labor; casting, rolling, forming, and machining at Y-12 to manufacture cases and CSAs for the stockpile and LEPs; and upgrades the enterprise's weapons Logistics, Accountability, Planning, and Scheduling (LAPS) system;
(4) General Management Support: Non-programmatic costs for program management and oversight, shared taxes, assignees, and support services contracts;
(5) Assessments & Studies (Use Control): Includes in-depth vulnerability assessments of nuclear weapons in the stockpile; identifying or developing and deploying common technologies to address vulnerabilities, if found; and special studies to support the decision processes for optimizing LEP designs and for option down-select decisions by senior officials;
(6) Surveillance: Efforts that focus on multi-system, common use, or non-weapon specific activities (data capture, flight test planning) supporting stockpile evaluation;

(7) External Production Missions: Provides weapon response subject matter experts across all systems and all laboratories – weapon response manning is critical to sustain safe operations at Pantex to support weapons delivery schedules. Supports Nuclear Safety Research and Development activities associated with nuclear operations leading to development of safety technologies with strategic partners; and improvements in safe nuclear explosive operations;
(8) Base Spares (Production): Activities that produce new non-weapon specific base spares, containers, LLC forgings, and other weapon components; and
(9) Base Spares (Maintenance): Activities associated with maintaining existing non-weapon specific base spares, handling gear/containers, GTSs, Use Control equipment, Code Management System equipment, and other weapon components.

Stockpile Services

Activities and Explanation of Changes

FY 2016 Enacted	FY 2018 Request	Explanation of Changes FY 2018 vs FY 2016
Production Support (PS) $447,527,000	**Production Support (PS) $470,400,000**	**Production Support (PS) +$22,873,000**
• Provide engineering and manufacturing operations for weapon operations including LEP, surveillance, dismantlement, and component production to meet directive schedules including revised W76-1 LEP production rate and to achieve DOD delivery schedules. • Provide labor to support purchasing, shipping, and materials management. • Provide labor and supplies for preventative maintenance and equipment calibrations. • Perform product certification the independent evaluation of build records for auditing purposes. • Provide quality assurance and procedural/engineering safety. • Provide classified computer network operations and maintenance in support of site production. • Execute Manufacturing Modernization Project (MMP) at LANL; project formerly named Integrated Work Execution and Production System Project (I-WEPS). • Provide maintenance and troubleshooting support for over 300 active testers. • Continue to maintain equipment and processes for Neutron Generator (NG) and power supply production to meet revised schedules. • Perform production capability infrastructure modernization. • Complete special projects including Environmental Conditioning, oven consolidation, calorimeter replacement, Mass Spectrometer replacement, and classified servers.	• Provide engineering and manufacturing operations for weapon operations including LEP, surveillance, dismantlement, and component production to meet directive schedules and meet DOD delivery schedules including: **1.** Equipment investments at LANL for detonator and DCA production to support increasing from one to five product lines and improving yield rate. **2.** Perform production capability infrastructure upgrades, including crucial upgrades to the Function Test Data Acquisition System and Unloading Laser. **3.** Support the Lithium Bridging Strategy via corrective maintenance on Material Conversion equipment and labor for Direct Material Manufacturing. • Continue engineering and quality assurance preparation at B61-12 non-nuclear component production. • Provide engineering and quality assurance support for internal containers that support production at Pantex and Y-12. • Continue the MMP at LANL in support of digital product acceptance, specifically completing the upgrade to the pit manufacturing line. • Provide labor for purchasing, shipping and material management. • Continue expansion of NG production at SNL up to five product lines, requiring increased maintenance and calibration services.	• The increase represents growth in base capabilities needed to support increased LEP workload. Specifically, increases of $10,000,000 in Engineering Operations, $4,950,000 in Manufacturing Operations, and $2,823,000 in Quality Supervision and Control to support upgrades to management and production systems, increased equipment and process costs necessary for weapon system sustainment and LEP FPU schedules, and upgrades associated with increasing production to five NG and five detonator/DCA product lines. Additionally, Purchasing, Shipping and Material Management increased by $5,100,000 to support internal containers at Pantex and Y-12 as well as increased labor throughout the enterprise to meet delivery schedules.

FY 2016 Enacted	FY 2018 Request	Explanation of Changes FY 2018 vs FY 2016
• Expand from two to five NG production lines at SNL, requiring increased quality and calibration services. • KCNSC continues preparation in engineering and quality for B61-12 LEP non-nuclear components. • Begin funding Nuclear Enterprise Assurance at SNL and KC NSC. • Y-12 W76-1 LEP plant floor and glove boxes reach steady-state production with an increase in upkeep of aged facilities that must now be maintained with delay in Uranium Production Facility completion. • Deferred Maintenance at Y-12 for Lithium Direct Material Manufacturing.	• Continue funding Nuclear Enterprise Assurance at all production sites. • Provide labor and supplies for preventative and corrective maintenance, including equipment calibration throughout the enterprise. • Provide quality assurance and procedural/engineering safety. • Provide classified computer shop-floor operations and maintenance in support of site production. • Perform product certification (independent evaluation of build records) for auditing purposes.	
Research and Development (R&D) Support $41,059,000	**Research and Development (R&D) Support $31,150,000**	**Research and Development (R&D) Support -$9,909,000**
• Further develop and demonstrate Quantification of Margins and Uncertainties (QMU) and apply QMU methodology toward assessment, certification, and qualification needs for the stockpile. • Continue providing scientific and technical support to the production plants to help achieve weapon production directives. • Reinvigorate the R&D infrastructure support at the national laboratories for archiving activities to support current Mods/ALTs/LEPs and software upgrades required to certify and qualify current Mods/ALTs/LEPs. • Support the operation and maintenance of the highly successful JILS tool at the three laboratories. • Support legacy commitments by maintaining the Nuclear Testing Heritage program. Conduct R&D	• Continue to develop and demonstrate QMU and apply QMU methodology toward assessment, certification, and qualification needs for the stockpile. • Continue providing scientific and technical support to the production plants to help achieve weapon production directives. • Electronically archive weapon data necessary to validate and verify predictive computational capabilities and simulations. • Support design and production agency experts serving detail assignments at NNSA HQ to provide technical advice and support. • Continue supporting the operation and maintenance of the JILS database at the design laboratories. • Continue supporting legacy commitments by maintaining Nuclear Testing Heritage activities.	• The decrease represents a reduction of $13,047,000 to address other NNSA high priorities such as deferred maintenance and secure transportation. The reduction is partially offset by an increase of $3,138,000 to implement supply chain risk mitigation strategies and quality assessments across the tri-labs.

FY 2016 Enacted	FY 2018 Request	Explanation of Changes FY 2018 vs FY 2016
projects for new technologies in support of LEP and stockpile modernization.	• Continue the development of staff technical skills and knowledge. • Continue implementing quality control procedures, methods, and processes in R&D activities. • Support limited infrastructure support activities at the laboratories. • Support the Light Initiated High Explosive facility • Maintain and upgrade computation/simulation systems and licenses and apply any tax that may be levied on an R&D program for building and capital use. • Maintain financial databases, milestone tracking, risk analyses, and R&D support for the POG and Nuclear Weapons Safety Study Group, including overseeing aspects of DSW Program Management, assigning R&D laboratory personnel/assignees to external/offsite federal organizations, and managing and executing R&D support service contracts. • Perform the laboratory work required to ensure that the production plants have the ability to execute directed R&D work.	
R&D Certification and Safety (RDCS) $185,000,000	**R&D Certification and Safety (RDCS) $196,840,000**	**R&D Certification and Safety (RDCS) +$11,840,000**
• Continue to annually assess using the Dual-Axis Radiographic Hydrodynamic Test Facility (DAHRT) the safety, security, and effectiveness of the enduring weapons systems in the stockpile, reporting weapon system status ultimately to the President, and determine if an underground nuclear test is required to solve a problem. • Continue to analyze, evaluate, and close high priority SFIs in accordance with the currently approved baseline closure plans.	• Continue annually assessing the safety, security, and effectiveness of the enduring weapons systems in the stockpile, reporting weapon system status ultimately to the President, and determine if an underground nuclear test is required to solve a problem. • Address and resolve SFIs and emerging stockpile issues in accordance with the currently approved baseline closure plans.	• The increase represents a growth of $24,790,648 for (DAHRT) at Los Alamos and Site 300 FXR facility at Livermore, support of hydrodynamic experiments and approaches to accelerating the engineering for these experiments, and support at Nevada to provide capabilities needed for execution of subcritical experiments. The increase is offset by a $12,950,648 reduction in technology development for realignment to higher risk NNSA priorities, such as deferred maintenance development activities for

FY 2016 Enacted	FY 2018 Request	Explanation of Changes FY 2018 vs FY 2016
• Continue design and development of GTS for the W87 ALT. • Continue development of High Efficiency Adaptable TM Transmitter for W88 Alteration Program. • Continue upgrade of the Code Management System for the legacy stockpile. • Continue design and development of LLCEs such as NGs, GTSs, energetics, and other replacement components. • Continue to identify other components which need to be developed and matured for future insertion opportunities to support approved MODs/ALTs. • Continue performing nuclear safety R&D studies and weapons effects studies. • Continue to sustain the infrastructure for conducting hydrodynamic tests in support of enduring stockpile systems and multiple system experiments. • Continue surety development. Continue development of hardware qualification; system certification and required computer modeling and simulation activities to sustain the stockpile. • Continue analysis of stockpile primary, secondary, chemistry, and materials systems analysis and annual assessments related to activities for the enduring stockpile. • Continue supporting subcritical and other experiments at Nevada National Security Site. • Continue supporting Independent Nuclear Weapon Assessment Teams activities, within the National Laboratories to assess the state of health and performance of the weapon system in support of the Annual Assessment Process.	• Continue limited design and development of LLCEs such as NGs, GTSs, energetics, and other replacement components. • Continue executing the JTD project according to given schedule and objectives • Continue to sustain the infrastructure for conducting hydrodynamic tests in support of enduring stockpile systems and multiple system experiments. • Continue analysis of stockpile primary, secondary, chemistry, and materials systems analysis and annual assessments related to activities for the enduring stockpile. • Continue supporting subcritical and other experiments at NNSS. • Continue supporting Independent Nuclear Weapon Assessment Teams activities, within the National Laboratories to assess the state of health and performance of the weapon system in support of the Annual Assessment Process. • Continue development of thermal batteries, abnormal launch accelerometers, detonation monitoring assemblies and other Safeguards components. • Begin a focused effort on the development of a new warhead bus architecture and ELNG for future system insertion. • Evaluate the effectiveness of sounding rockets and superfuges for the qualification of weapon components.	improvements to secure transportation and application specific development of integrated surety architectures. The remaining technology development investment will focus on the U.S./UK JTD project and development of component technologies for future insertions.

FY 2016 Enacted	FY 2018 Request	Explanation of Changes FY 2018 vs FY 2016
• Continue development of thermal battery, surety components, abnormal launch accelerometer, and detonation monitoring assembly. • Continue development of aluminum reservoir, radar improvements, and small advanced fireset with enhanced technology.		
Management, Technology, and Production (MTP) $264,994,000	**Management, Technology, and Production (MTP) $285,400,000**	**Management, Technology, and Production (MTP) +$20,406,000**
• Execute surveillance activities in accordance with FY 2016 PCDs and FY 2016 Integrated Weapon Evaluation Team (IWET) Plans. Includes critical deferred and required multi-system surveillance activities to include testing requirements for LEPs. • Add multi-system weapon response and external production resources to provide safety studies for un-interrupted assembly/disassembly operations at production plants. • Replace the nuclear security enterprise Image Management System (IMS) for authorized document production with the Product Realization Information Management Enterprise (PRIME) technology stack. • Study options to improve safety and use control technologies for future LEPs. • Perform operations and maintenance of the Integrated Digital Enterprise to collect, process, store, and transmit data among the nuclear security enterprise design laboratories and production plants. • Respond to DOD Unsatisfactory Reports (URs) about issues with the stockpile. • Provide DOD training on weapons maintenance activities in the field.	• Increase in Use Control studies and equipment procurements and equipment procurements supporting LEP FPUs, the enduring stockpile, and external deliverables. Increased Use Control training with DOD customers. • Execute surveillance activities in accordance with FY 2018 PCDs, and FY 2018 IWET Plans. Includes increased efforts at Tonopah Test Range and development of surveillance testers including stronglink, environmental, and centrifuges required to support LEP testing requirements. • Add multi-system weapon response and external production resources to provide weapon response services and conduct nuclear safety studies for un-interrupted manufacturing/assembly/disassembly operations at production plants. • Continue the multi-year effort to upgrade and integrate the weapons Logistics, Accountability, Planning and Scheduling (LAPS) system. • Sustainment of critical manufacturing skills in support of LEP production. • Perform operations and maintenance of the Integrated Digital Enterprise to collect, process, store, and transmit data among the nuclear	• The increase includes an additional $18,005,000 for Assessments and Studies (Use Control) for studies and for equipment procurements supporting LEP FPUs, the enduring stockpile, and external deliverables. This increase also supports additional Use Control training with DOD customers. An $8,614,000 increase in Surveillance for increased efforts at Tonopah Test Range and development of surveillance testers including stronglink, environmental, and centrifuges. These increases are offset by a $6,213,000 decrease in General Management Support and Maintenance of Non-Weapon Specific Base Spares.

FY 2016 Enacted	FY 2018 Request	Explanation of Changes FY 2018 vs FY 2016
• Perform production and maintenance of test and handling gear, spare parts for DOD, and containers. • Execute production of weapon components for use in multiple weapon systems including batteries, stronglinks, switch tubes, polymers, and containers. • Conduct program management and oversight of weapon sustainment activities. • Maintain uranium processing capability. • Conduct weapons Use Control Studies. • Replacement of the multi-port test valve for the GTS function testing at Savannah River Site for all systems.	security enterprise design laboratories and production plants. • Respond to DOD URs about issues with the stockpile. • Provide DOD training on weapons maintenance activities in the field. • Perform production and maintenance of test and handling gear, spare parts for DOD, and containers. • Execute production of weapon components for use in multiple weapon systems, for example, batteries, stronglinks, switch tubes, polymers, and containers. • Conduct program management and oversight of weapon sustainment activities. • Re-establish additional uranium processing capabilities at Y-12.	

Directed Stockpile Work
Strategic Materials

Description

The Strategic Materials program consolidates management of nuclear material processing capabilities within the nuclear security enterprise. The program includes Uranium, Plutonium and Tritium Sustainment, Domestic Uranium Enrichment, and Strategic Materials Sustainment.

Uranium Sustainment

The Uranium Sustainment Program mission continues the Area 5 de-inventory efforts to reduce safety risks, implements a new model of near just-in-time material inventories, and increases the reliability of uranium capabilities such as through the replacement of obsolete non-capital equipment, increased equipment maintenance, and the purchase of critical spare parts. Additional uranium investments are also made under the Processing Technology Development subprogram within Advanced Manufacturing Development.

Uranium Sustainment includes the following:

(1) Continue the Y-12 Area 5 de-inventory efforts to reduce safety, security, and mission risks.

(2) Implement a new model for near just-in-time material inventories.

(3) Support additional efforts to develop, sustain, and increase the reliability of uranium scientific and manufacturing capabilities

Additional work related to the Uranium Strategy and ceasing enriched uranium programmatic operations in Building 9212 by FY 2025 is described in the Process Technology Development line within the Advanced Manufacturing Development program.

Plutonium Sustainment

The NNSA Plutonium Sustainment Program provides a plutonium-based component manufacturing capability at reliable capacities to sustain a safe, secure, and effective nuclear deterrent. The program provides the equipment and personnel necessary to fabricate plutonium pits, qualify and certify produced pits for stockpile use, and manufacture precision plutonium devices for science-related evaluation. The program supports the requirements for pit production outlined in the FY 2015 National Defense Authorization Act (NDAA) which directs NNSA to produce 10 war reserve pits in 2024, 20 war reserve pits in FY 2025 and 30 war reserve pits in FY 2026. Additionally, the program recovers ^{238}Pu for Defense Programs and invests in ^{238}Pu-related capabilities for the stockpile.

Plutonium Sustainment includes the following:

(1) Plutonium pit process engineering, process qualification, pit manufacturing, pit manufacturing equipment and personnel, pit fabrication tooling design and manufacturing, and non-nuclear pit component manufacturing.

(2) Design laboratory and production plant activities for plutonium stockpile product development.

(3) Engineering and physics-based evaluation and testing of development pits necessary for war reserve production.

(4) Fabrication of design definition development pits that explore new design features.

(5) Fabrication of plutonium devices for science and stockpile-related subcritical experiments.

(6) Recovery and reclamation of strategic quantities of ^{238}Pu for stockpile needs.

(7) Plutonium manufacturing support effort such as radiological control program, facility and equipment maintenance, criticality safety program, shipping and receiving, authorization basis, work control documentation, training and qualification, and spare parts.

(8) A variety of critical support activities including waste management, storage capability, and nuclear operations infrastructure and facility configurations that are required to maintain plutonium capabilities at LANL.

Tritium Sustainment

The Tritium Sustainment Program operates the national capability for producing tritium, and is taking steps to build additional capacity required for national security requirements. Since FY 2003, NNSA has been producing tritium by irradiating tritium-producing burnable absorber rods (TPBARs) in the Watts Bar Unit 1 (WBN1) nuclear power reactor operated by the Tennessee Valley Authority (TVA), during the normal 18-month operating cycles. Annual *ex*tractions of tritium from TPBARs at the Tritium Extraction Facility (TEF) at DOE's Savannah River Site (SRS) began in FY 2007. The program maintains a contingency option to use reactors at TVA's Sequoyah site for backup. The tritium inventory is needed to support LLCEs for tritium reservoirs that are deployed in the stockpile. NNSA has coordinated with DOD to determine the tritium requirements needed for national security, and provides annual updates to DOD on tritium production and inventory status. Tritium is not consumed in the stockpile but radioactively decays at approximately 5.5% per year, requiring ongoing replenishment. Long-term tritium production schedules, based on detailed computational models, are carefully calibrated to provide the required and reserve amounts, and production planning takes into consideration the material that is constantly being recovered and recycled from deployed reservoirs including those from dismantlements. During FY 2015, NNSA conducted a bottom-up review of tritium requirements and production capabilities, involving assessment of future stockpile scenarios, inputs from design labs for gas transfer systems and physics labs, assessment of tritium production supply chain options, and interactions with DOD customers. Based on the updated tritium requirements, certified by the Nuclear Weapons Council, efforts are underway to bring a second TVA reactor, WBN2, into tritium production in FY 2021. Efforts are underway to obtain NRC approval of WBN2 as the second reactor for tritium production, to begin irradiation of TPBARs in FY 2021.

The Tritium Sustainment mission scope includes:

(1) TPBAR Technology: Tritium production requires active design, surveillance, and research and development efforts to support irradiation of TPBARs by TVA. This includes post-irradiation examination of limited use assembly (LUA) TPBARs to evaluate the performance effects of component vendor changes and design refinements, as well as providing the technical evaluation, monitoring, and analysis required by the NRC. Each TPBAR irradiation cycle at TVA requires design analysis and certification of the TPBAR for each new fuel core design configuration. Test and evaluation efforts in Idaho National Laboratory's Advanced Test Reactor are underway to understand the time-release performance of the lithium-aluminate pellets and to evaluate pellet configurations with less volume. Void volume in the TPBAR is a limiting factor on TPBAR failures in a reactor accident, and thinner pellets may be able to increase internal void volume, reducing internal pressure, and allowing for lower fuel enrichment and improved reactor operating conditions. Reduced internal pressure may also reduce the permeation release of tritium from the TPBARs to the reactor coolant system and to the environment. In addition, other tests are required to understand indications of an in-reactor TPBAR failure, a dropped TPBAR in the spent fuel pool, and the shelf-life limitation and storage requirements for TPBAR components. Technology also includes providing safety analysis to support licensing actions, and maintaining design and quality programs to support TPBAR fabrication.

(2) TPBAR Fabrication: TPBAR fabrication involves commercial contracts for maintaining the fabrication prime contractor and its subcontractor supply chain to provide a dozen specialized components and assemble these into TPBARs required to meet each 18-month refueling cycle at TVA's reactors. This includes maintaining two vendors that provide the processes for producing the plated zircaloy getters and the specially coated stainless steel cladding tubes that, respectively, enable the TPBAR to trap tritium within and minimize its permeation to the reactor coolant system. The TPBAR fabrication vendor must also restart production of zircaloy liners and lithium-aluminate pellets that were produced in a very large batch more than 10 years ago and are now running out.

(3) TPBAR Irradiation: The production of tritium occurs in TVA's nuclear reactor when lithium-aluminate pellets in the TPBAR are bombarded by neutrons over a period of 18 months. DOE and TVA entered into an Interagency Agreement in 1999 under which TVA provides irradiation services in accordance with the national security provision in TVA's original charter. This Interagency Agreement is subject to the Economy Act that requires TVA to be reimbursed for all tritium related costs but no profit. There are two main costs associated with providing reactor fuel for tritium production. TVA computes the cost of reactor fuel with and without TPBARs and invoices NNSA for the cost of the excess fuel required. Current policy requires that TVA acquire unobligated low enriched uranium (LEU) fuel and that NNSA pay any difference in the price of unobligated enrichment compared to fuel TVA obtains for its Brown's Ferry reactors on the open market. At present, unobligated fuel purchased by TVA will come from Energy Northwest (ENW), who entered into an arrangement in May 2012 to have a quantity of DOE's high assay tails or depleted uranium enriched at the Paducah Gas Diffusion Plant before it was shut down in May 2013. At that time, the enrichment price to TVA was set at $150 per separative work unit in FY 2012 dollars, escalated at two percent a year. The subsequent softening of the uranium fuel market after the Fukushima event and due to recent worldwide energy surpluses has caused the enrichment price differential payments to increase significantly compared to original estimates; fuel deliveries from ENW will continue through FY 2022.

(4) TPBAR Transportation: After the TPBARs are irradiated for 18-months, the radioactive TPBARs are loaded into consolidation canisters, placed in specialized shipping casks, and trucked from TVA to the TEF at SRS. This transportation, which also provides for commercial security protection for the shipments, is handled by a commercial contractor under long-term contract to NNSA. In addition, radioactive-contaminated hardware fixtures used in tritium production are transported to the NNSS for disposal after each irradiation cycle.

(5) TPBAR Extraction: TPBAR extraction takes place at the TEF at SRS. TPBARs are received from shipments from TVA in batches of 300 TPBARs per canister. Prior to extraction, the TPBARs are prepared by cutting the heads off each individual rod. After this process, a canister containing the TPBARs is moved into the extraction furnace where a special vacuum-thermal process is employed to extract the tritium. Once waste gases are separated from the product gas, the purified tritium is piped directly to the loading and unloading facility, next door at SRS, where it is loaded into gas transfer systems to meet the schedule for limited life component exchanges for deployed units under custody of the DOD. Since starting, the TEF has been conducting one extraction a year. In FY 2017, the TEF will conduct three extractions in succession. This is to exercise and evaluate the processes that will be required when the TEF must eventually go up to as many as seven a year. In FY 2018, the TEF will return to its responsive operations mode, where personnel are rotated to other buildings and tasks when not involved in extraction operations. In addition to maintaining the facility in a state of operational readiness and conducting periodic extractions, this $500 million facility requires a number of infrastructure improvement and upkeep projects, some of which span multiple years. FY 2018 project work is for thermocouple replacements.

Domestic Uranium Enrichment

The Domestic Uranium Enrichment (DUE) Program provides a reliable supply of enriched uranium to support U.S. national security and non-proliferation needs. Program requirements include providing unobligated uranium to support tritium production as well as varying uranium assays and forms to provide fuel for research reactors and naval reactors. The DUE program will implement a three-prong strategy. First, the DUE program will rely on down blended HEU from the uranium inventory to extend the need date for unobligated low enriched uranium fuel for tritium production. DUE will support, as needed, down blending work managed through Defense Nuclear Nonproliferation that will be used to produce fuel for tritium production. Down blending contracts are anticipated to be managed through Defense Programs beginning in FY 2019. Second, DUE will work to preserve and advance uranium enrichment expertise and technology to meet current and future U.S. government needs. Research and development activities will improve knowledge of uranium enrichment, while establishing and maintaining a core of personnel, laboratories, and equipment. Third, DUE will lead the acquisition process to reestablish a domestic uranium enrichment capability to support tritium production at some point in the future.

The Domestic Uranium Enrichment mission scope includes:

- Activities to preserve and advance uranium enrichment expertise and technology to meet current and future U.S. government needs.
- Continue the acquisition process to establish mission need (CD-0) for a domestic uranium enrichment capability to support tritium production.
- Support and manage down blending of HEU from the uranium inventory.

Strategic Materials Sustainment

The Strategic Materials Sustainment program is responsible for the planning of, prioritizing, and supplying required quantities of materials by recycling, recovering, and storing nuclear material and select non-nuclear program material. The program develops strategies to maintain the technical base for strategic materials. The program supports the nuclear security missions, which include nuclear weapons, non-proliferation, and naval reactors activities at the eight NNSA sites: three national security laboratories, four nuclear weapons production facilities, and the NNSS. The program is comprised of four subprograms, Material Recycle and Recovery, Storage, Nuclear Material Integration, and Strategic Planning Efforts.

The Strategic Materials Sustainment mission scope includes:

(1) **Material Recycle and Recovery (MRR) and Storage:** responsible for the recovery and recycle of material streams necessary to maintain the nation's nuclear deterrent; provides storage and material forecasting capabilities for these materials; and provides recapitalization investment for the processes and human capital necessary to safely sustain the highest quality operations in an efficient manner.

The subprograms provide a collaborative interface with Uranium, Plutonium, and Tritium Sustainment to develop milestones and program goals that reduce legacy material accumulation that impacts material at risk (MAR), improves supply chain efficiency, and dispositions process by-products.

At Y-12, MRR activities support the implementation of new, as well, as improved processes for fabrication and recovery operations, material stabilization, conversion, and interim storage. Activities are aligned to support the W76-1 LEP production and future LEPs. Other uranium related mission work supported by MRR funding includes maintaining a purified metal production capability needed for LEPs and Naval Reactors, and processing and disposition of legacy materials to meet the 2025 goal of ceasing programmatic operations in Building 9212. In addition, MRR provides purified depleted uranium feedstock for the stockpile.

At LANL, MRR provides funding for the Chemistry and Metallurgy Research (CMR) de-inventory effort, the Confinement Vessel Disposition project, Weapons Engineering Tritium Facility (WETF) de-inventory and the PF-4 vault de-inventory in order to consolidate and disposition excess materials, provide required capability for Defense Program's needs, and reduce nuclear safety risk and personnel radiological exposure.

At SRS, MRR provides funding for the operations associated with the recovery of tritium supporting LLCs. This includes recapitalization efforts to reduce operational risk incurred by utilizing equipment beyond its intended design life.

The Storage subprogram provides for storage and management of pits, plutonium, enriched and depleted uranium, lithium, tritium, weapons components and other materials. The Storage subprogram also includes long-term planning, forecasting and analysis of materials required for the manufacturing strategy in support of the nuclear weapons stockpile. Storage is an integral part of the de-inventory supply chain at Y-12 and LANL.

At LANL, NNSS, and Y-12, the Storage scope includes development and implementation of containers compliant with DOE Manual (M) 441.1-1. At Pantex, Storage provides pit surveillance operations and equipment for safe storage, long-term storage of special nuclear materials, and national security inventory thermal monitoring and characterizations.

(2) **Nuclear Materials Integration (NMI):** maintains and operates the Nuclear Materials Management and Safeguards System (NMMSS), which tracks and accounts for nuclear materials at DOE and Nuclear Regulatory Commission-licensed

sites, and the Nuclear Materials Inventory Assessment (NMIA) that manages use and demand of accountable nuclear materials by DOE and NNSA laboratories and production plants. NMI also consolidates and disposes of excess NNSA nuclear materials and other unclaimed materials. This includes inactive actinides activities that ensure programmatic materials not in active use are properly characterized and safely packaged, and that unclaimed materials have an appropriate disposition path. NMI is also responsible for the funding and management of the DOE Lead Material Management Organization (LMMO) for Heavy Isotopes.

(3) Strategic Planning Efforts (SPE): Initiates programmatic planning for the development of infrastructure strategies for high explosives (HE), lithium, micro-electronics, beryllium, tritium, and other capabilities. These strategies focus on ensuring NNSA maintains the technical base for certain materials of strategic significance, and has sufficient capabilities to support the enduring stockpile. Strategic planning facilitates early research into cost-effective solutions to technical, material, personnel, and logistics issues. It provides solutions to be undertaken before these issues begin to negatively impact the enduring stockpile. In addition, it also seeks to optimize resource utilization across the nuclear weapons complex and reduce uncertainty before committing major investments into solutions.

Strategic Materials

Activities and Explanation of Changes

FY 2016 Enacted	FY 2018 Request	Explanation of Changes FY 2018 vs FY 2016
Uranium Sustainment $32,916,000	**Uranium Sustainment $20,579,000**	**Uranium Sustainment -$12,337,000**
• Expand and accelerate Area 5 de-inventory efforts to reduce safety, security, and mission risks. • Implement a new model for near just-in-time material inventories. • Sustain and increase the reliability of uranium capabilities through replacement of obsolete non-capital equipment, increased equipment maintenance, and the purchase of critical spare parts.	• Continue Area 5 de-inventory efforts to reduce safety, security, and mission risks. • Operate at near just-in-time material inventories. • Continued support of efforts to develop, sustain, and increase the reliability of uranium scientific and manufacturing capabilities.	• The decrease represents a rebalancing of resources between Uranium Sustainment and Process Technology Development within the Advanced Manufacturing Program to more efficiently execute the enriched uranium strategy. This directly supports ceasing enriched uranium programmatic operations in Building 9212 by 2025. An additional decrease results from a change in pension strategy.
Plutonium Sustainment $174,698,000	**Plutonium Sustainment $210,367,000**	**Plutonium Sustainment +$35,669,000**
• Continue to maintain base personnel and sustain pit-manufacturing capability. • Continue to upgrade end-of-life equipment vital to the pit manufacturing mission by significant equipment investments necessary for modernization in capability, capacity, and certification • Begin W87 design developmental pit builds. • Begin engineering evaluation of development pits or pit certification. • Continue recovery of ^{238}Pu. • Invest in equipment needed to support increased pit production. • Continue to fabricate plutonium experimental devices. • Participate in the LANL Landlord Cost Recovery Program based on services for: distributed, non-fixed operating costs in the plutonium facility; analytical chemistry distributed variable, non-	• Continue to maintain base personnel while adding additional personnel to ramp up work and sustain pit-manufacturing capability. • Continue to upgrade end-of-life equipment vital to the pit manufacturing mission by significant equipment investments necessary for modernization in capability, capacity, and certification. • Invest in equipment and personnel needed to support increased pit production. • Continue W87 design developmental pit builds. • Continue engineering evaluation of development pits. • Continue recovery of ^{238}Pu. • Continue to fabricate plutonium experimental devices. • Participate in the LANL Landlord Cost Recovery Program based on services for distributed, non-fixed operating costs in the plutonium facility; analytical chemistry distributed variable, non-	• The increase will support additional personnel and equipment needed to ramp pit production to meet NDAA pit production requirements. • Funding supports pre-conceptual design and planning efforts for the proposed Plutonium Modular Approach.

FY 2016 Enacted	FY 2018 Request	Explanation of Changes FY 2018 vs FY 2016
fixed costs; and waste processing distributed, non-fixed costs.	fixed costs; and waste processing distributed, non-fixed costs.	
Tritium Sustainment $104,600,000	**Tritium Sustainment $198,152,000**	**Tritium Sustainment +$93,552,000**
• Commence irradiation of 704 TPBARs in TVA's Watts Bar Unit 1 (WBN1) reactor Cycle 14; reimburse TVA for irradiation services, management and engineering support, additional reactor fuel, and enrichment price differentials for unobligated fuel purchased from Energy Northwest for WBN1. • Obtain NRC approval for WBN1 to irradiate up to 1792 TPBARs. • Complete a Supplemental Environmental Impact Statement to address bounding cases for tritium production and issue a Record of Decision. • Begin planning for an improved safety analysis for WBN1 LAR to the NRC to reduce fuel requirements and improve reactor operating margins. • Begin execution of a project plan to license TVA's Watts Bar Unit 2 (WBN2) reactor for tritium production to begin in FY 2021. • Maintain the TEF in responsive operations mode and perform infrastructure projects to prepare TEF for multiple annual extractions. • Provide technical production support and surveillance of TVA production operations by the TPBAR design authority in support of NRC requirements, reduce program risks and improve the reliability of tritium production. • Complete first run of in-reactor testing on tritium-producing lithium-aluminate pellets in the Advanced Test Reactor (ART) at Idaho National Laboratory (INL) to improve safety and performance.	• Complete irradiation of 1104 TPBARs in Cycle 15 at WBN1 that were inserted in FY 2017; continue reactor core analysis for increased production and lower fuel enrichment; submit LAR for a second tritium production reactor, WBN2; provide fuel enrichment premiums for unobligated fuel from Energy Northwest; and maintain unobligated fuel inventories. • Incorporate lessons learned from conducting three back-to-back TPBAR extractions in FY 2017, and conduct one extraction at the TEF in preparation for three extractions in FY 2019 and four in FY 2021; conduct preventative maintenance to maintain TEF readiness, provide thermocouple replacements in the extraction furnace at the TEF. • Maintain the TPBAR designer of record and address technical issues for increasing TPBAR production and NRC licensing actions; conduct post irradiation examination of Cycle 14 limited use assembly rods at PNNL for potential design refinements; continue irradiation of pellet performance test fixtures at INL's ATR and ship test samples to PNNL to commence PIE; conduct tritium experiments, analysis, and modeling to reduce tritium production risks; monitor developments of future technologies with potential for tritium production to reduce long-term mission risks. • Complete building 1408 TPBARs and deliver to TVA for WBN1 Cycle 16; continue procurements of	The increase represents the following: • Costs at TVA increased by $60,000,000 primarily due to costs for unobligated reactor fuel, for example, FY 2018 fuel deliveries from ENW are three times greater than in FY 2016 resulting in a $40,000,000 increase in enrichment price differential payments; also, irradiation fees increased due to TPBAR production going from 704 to 1104. • Costs for TPBAR fabrication and components increased by $9,400,000 from previous estimates due to the need to separately contract for procurement of TPBAR components not covered in the fixed price fabrication contract. • Costs at the TEF are estimated to increase by $20,200,000 for pension and overhead adjustments, increased staffing to prepare and train operators for the extraction tempo in full operations mode, and additional upkeep projects, in particular, to replace a worker protection system that is no longer supported by suppliers. • Other costs increased by $3,952,000 for TPBAR transportation services and program support.

FY 2016 Enacted	FY 2018 Request	Explanation of Changes FY 2018 vs FY 2016
• Award a nine year contract option for TPBAR fabrication and begin fabrication of 1104 TPBARs for WBN1 Cycle 15; award new contracts for TPBAR liner and pellet production. • Ship one batch of 300 irradiated TPBARs from TVA to the TEF.	new pellets, liners, full-length getters and other TPBAR components. • Complete Cycle 14 TPBAR transport with two shipments to the TEF, and provide for the next TPBAR transportation services contract.	
Domestic Uranium Enrichment $50,000,000	**Domestic Uranium Enrichment $60,000,000**	**Domestic Uranium Enrichment +$10,000,000**
• Preserve and advance uranium enrichment expertise and technology to meet current and future U.S. government needs. Begin the acquisition process to establish mission need (CD-0) for a domestic uranium enrichment capability to support tritium production.	• Preserve and advance uranium enrichment expertise and technology to meet current and future U.S. government needs. • Continue the acquisition process to approve the alternative selection and cost range (CD-1) for a domestic uranium enrichment capability to support tritium production. • Y-12 will begin to prepare material for the down blending campaign, scheduled to start in FY 2019.	• The increase will be used to begin preparing material for the down blending campaign, scheduled to start in FY 2019.
Strategic Materials Sustainment $250,040,000	**Strategic Materials Sustainment $206,196,000**	**Strategic Materials Sustainment -$43,844,000**
• Continue to provide for recycling and recovery of plutonium, enriched uranium, lithium, tritium, and other materials from fabrication and assembly operations, LLCs, dismantlement of weapons, and nuclear components o At Y-12, characterize and procuring existing supplies of high purity depleted uranium, maintain a purified metal production capability needed for LEPs and Naval Reactors, and process and dispose of legacy materials to meet the 2025 goal of ceasing programmatic operations in Building 9212. o At LANL, continue the Chemistry and Metallurgy Research (CMR) de-inventory effort, the Confinement Vessel Disposition project, WETF de-inventory and the PF-4 vault de-inventory.	• Continue to provide for recycling and recovery of plutonium, enriched uranium, lithium, tritium, and other materials from fabrication and assembly operations, LLCs, dismantlement of weapons, and nuclear components o At Y-12, characterize and procuring existing supplies of high purity depleted uranium, maintain a purified metal production capability needed for LEPs and Naval Reactors, and process and dispose of legacy materials to meet the 2025 goal of ceasing programmatic operations in Building 9212. o At LANL, continue the CMR de-inventory effort, the Confinement Vessel Disposition project, WETF de-inventory and the PF-4 vault de-inventory.	• The decrease represents a reduction in MRR due to the deferral of the re-establishment of a purified depleted uranium feedstock capability. The movement of several requirements from SPE to other programs. The planning and design of CBI projects was moved to Recapitalization- CBI, under Infrastructure & Operations. Planning for the Plutonium Modular Approach is now funded by Plutonium Sustainment, and completion of several technology development requirements was moved to other programs in DSW and RDT&E.

FY 2016 Enacted	FY 2018 Request	Explanation of Changes FY 2018 vs FY 2016
o At SRS, continue the operations associated with the recovery of tritium supporting LLCs. Continue recapitalization efforts to reduce operational risk incurred by utilizing equipment beyond its intended design life. • Initiate procurement of a depleted uranium feedstock capability which was deferred pending a supply and demand analysis. • Provide for effective storage and management of pits, highly enriched uranium (HEU), and other weapon nuclear and non-nuclear materials. Includes: receipt, storage, and inventory of nuclear materials, non-nuclear materials, HEU, depleted uranium and lithium. o At LANL, NNSS, and Y-12, develop and implement containers compliant with DOE Manual (M) 441.1-1. o At Pantex, continue pit surveillance operations for safe storage, long-term storage of special nuclear materials, and national security inventory thermal monitoring and characterizations. • Provide long-term forecasting, planning and analysis of materials. • Continues to support the emphasis on nuclear material consolidation and de-inventory activities across the NSE. • In partnership with the NRC, operate and maintain NMMSS. • Continue activities to remove plutonium-bearing mixed oxide fuel from SNL. • Continue to treat, consolidate, and dispose of NNSA inactive actinides that are no longer required. • Continue the process and disposition of NNSA materials currently stored at non-NNSA sites,	o At SRS, continue the operations associated with the recovery of tritium supporting LLCs. Continue recapitalization efforts to reduce operational risk incurred by utilizing equipment beyond its intended design life. • Provide for effective storage and management of pits, highly enriched uranium (HEU), and other weapon nuclear and non-nuclear materials. Includes: receipt, storage, and inventory of nuclear materials, non-nuclear materials, HEU, depleted uranium and lithium. o At LANL, NNSS, and Y-12, develop and implementation of containers compliant with DOE Manual (M) 441.1-1. o At Pantex, continue pit surveillance operations for safe storage, long-term storage of special nuclear materials, and national security inventory thermal monitoring and characterizations. • Provide long-term forecasting, planning and analysis of materials. • Continues to support the emphasis on nuclear material consolidation and de-inventory activities across the NSE. • In partnership with the NRC, operate and maintain NMMSS. • Continue activities to remove plutonium-bearing mixed oxide fuel from SNL. • Continue to treat, consolidate, and dispose of NNSA inactive actinides that are no longer required. • Continue the process and disposition of NNSA materials currently stored at non-NNSA sites, including the sodium bonded fuel experiment assemblies from SNL that are stored at INL.	

FY 2016 Enacted	FY 2018 Request	Explanation of Changes FY 2018 vs FY 2016
including the sodium bonded fuel experiment assemblies from SNL that are stored at INL. • Maintain Heavy Isotopes LMMO at Oak Ridge National Laboratory (ORNL), including recovery of spent Californium sources. • Continue activities to recover Pu-244 and other national asset isotopes from Mk-18a targets in storage at SRS. • Perform planning studies and analyses relating to the life-cycle management of nuclear materials. • In SPE, developed infrastructure strategies to assure NNSA maintains the technical base for certain materials of strategic significance. Executed planning and design of Capabilities Based Investments (CBI) projects, planning for the Pu Modular Approach, and completed several projects in early technology development.	• Maintain Heavy Isotopes and NNMA LMMOs, including recovery of spent Californium sources. • Continue activities to recover Pu-244 and other national asset isotopes from Mk-18a targets in storage at SRS. • Perform planning studies, research, and analyses relating to the life-cycle management of nuclear materials. • Pilot Test Recovery of University Fuels. • In SPE, continue High Explosives Enterprise Infrastructure Planning and long range planning to support LLNL's B231 NEP Engineering and Materials Capabilities Transformation. Continue development of other infrastructure strategies, research into cost effective solutions to technical, material, personnel and logistic issues, and analyses of alternatives to optimize resource utilization across the nuclear enterprise.	

Directed Stockpile Work
Performance Measures

In accordance with the GPRA Modernization Act of 2010, the Department sets targets for, and tracks progress toward, achieving performance goals for each program.

	FY 2016	FY 2017	FY 2018
Performance Goal (Measure)	**Annual Warheads Certification -** Annual percentage of warheads in the stockpile that is safe, secure, reliable, and available to the President for deployment.		
Target	100 % of stockpile certified	100 % of stockpile certified	100 % of stockpile certified
Result	Met - 100	TBD	TBD
Endpoint Target	Annually, maintain 100% of warheads in the stockpile as safe, secure, reliable, and available to the President for deployment.		
Performance Goal (Measure)	**Retired Weapons Systems Dismantlement -** Complete the dismantlement of all weapon systems in excess to stockpile requirements per approved annual schedule published in the Planning and Program Directive (P&PD), Program Control Document (PCD), and the Requirements and Planning Document (RPD) "annual" documentation with a goal of balancing dismantlement work by mitigating gaps in future stockpile reductions.		
Target	100 % of annual planned dismantlements	100 % of annual planned dismantlements	100 % of annual planned dismantlements
Result	Exceeded - 102	TBD	TBD
Endpoint Target	Complete by FY 2021 the dismantlement of the quantity of weapons in retired status at the end of FY 2008.		
Performance Goal (Measure)	**Steady State W-76-1 LEP Production -** The percentage of planned builds equal to the percentage of allocated funding as represented in the annual Selected Acquisition Report (SAR).		
Target	100 % of scheduled unit builds	100 % of scheduled unit builds	100 % of scheduled unit builds
Result	Met - 100	TBD	TBD
Endpoint Target	Complete production of the NWC-approved W76-1 LEP production schedule by FY 2019.		
Performance Goal (Measure)	**Tritium Production -** Cumulative number of Tritium-Producing Burnable Absorber Rods irradiated in Tennessee Valley Authority reactors to provide the capability of producing new tritium to support national security requirements.		
Target	3,120 TPBARs	3,824 TPBARs	4,928 TPBARs
Result	Met - 3,120	TBD	TBD
Endpoint Target	By the end of FY 2020, complete irradiation of 5,104 Tritium-Producing Burnable Rods (TPBARs) to provide tritium for nuclear weapons. Note: Irradiation of TPBARs is completed every 18 months, or 1.5 years, in approximately October or March. For FY 2013, the irradiation cycle started in October of 2012. Thus, there is no increase to the number of TPBARs irradiated in FY 2013 and, for the same reason, no increase in FY 2016 or FY 2019. This performance measure was moved from the Readiness Campaign in the FY 2014 appropriation.		

Directed Stockpile Work
Capital Summary[a]

(Dollars in Thousands)

	Total	Prior Years	FY 2016 Enacted	FY 2016 Current	FY 2017 Annualized CR*	FY 2018 Request	FY 2018 vs FY 2016
Capital Operating Expenses Summary (including Major Items of Equipment (MIE))							
Capital Equipment >$500K (including MIE)	N/A	N/A	94,607	94,607	106,086	101,578	+6,971
Plant Projects (GPP and IGPP)	N/A	N/A	6,288	6,288	7,231	11,033	+4,745
Total, Capital Operating Expenses	**N/A**	**N/A**	**100,895**	**100,895**	**113,317**	**112,611**	**+11,716**
Capital Equipment > $500K (including MIE)							
Total Non-MIE Capital Equipment	N/A	N/A	70,986	70,986	72,548	74,144	+3,158
Coordinate Measurement Machine #1, LANL	28,533	9,191	5,740	5,740	8,602	5,000	-740
Coordinate Measurement Machine #2, LANL	22,596	2,594	3,989	3,989	7,113	8,900	+4,911
Parts Cleaning for Direct Lithium Material Manufacturing, Y-12	10,300	0	2,000	2,000	8,300	0	-2,000
Replacement of Electronic Beam Welder #1	9,073	3,165	3,382	3,382	2,526	0	-3,382
Precision Machining, LANL	8,082	5,013	1,031	1,031	2,038	0	-1,031
Molecular Beam Epitaxy System	10,170	0	0	0	0	10,170	+10,170
CoLOSSIS II, PX	13,292	3,585	6,033	6,033	3,074	600	-5,433
CNC Waist Banding Lathe #1, LANL	5,225	1,794	1,446	1,446	1,485	500	-946
CNC Waist Banding Lathe #2, LANL	2,664	0	0	0	400	2,264	+2,264
Large Chamber EBEAM Welder, LANL	0	0	0	0	0	0	0
Total, Capital Equipment (including MIE)	**N/A**	**N/A**	**94,607**	**94,607**	**106,086**	**101,578**	**+6,971**
Plant Projects (GPP and IGPP)							
Total Plant Projects (GPP/IGPP) (Total Estimated Cost (TEC) <$5M)	N/A	35,236	6,288	6,288	6,426	6,567	+279
12-64 Bays 6, 11, 12 & 15 Replacement Facilities	5,283	0	0	0	0	708	+708
Bldg. 92042E Dry Room Control Upgrades	8,139	0	0	0	805	3,758	+3,758
Total, Plant Projects (GPP/IGPP)	**N/A**	**N/A**	**6,288**	**6,288**	**7,231**	**11,033**	**+4,745**
Total, Capital Summary	**N/A**	**N/A**	**100,895**	**100,895**	**113,317**	**112,611**	**+11,716**

[a] FY 2016 funding is $2,000 under CBI, FY 2017 actual will be $8,300 ($7,800 WDD and $500 CBI).

Science

Overview

The Science program provides the knowledge and expertise needed to maintain confidence in the nuclear stockpile without nuclear testing. Capabilities developed and maintained in the Science program provide: (1) the basis for annual assessments of weapon performance and certification of life extension programs (LEPs), (2) understanding of the impacts of surveillance findings to assure that the nuclear stockpile continues to meet military requirements, and (3) the core technical expertise required to be responsive to global nuclear security policy questions. Science deliverables facilitate assessing current weapon and weapon component lifetimes. They also facilitate development and qualification of modern materials and manufacturing processes, concepts for reuse of certain components, and modern safety concepts for the sustainment programs.

Science performs strategic experiments to obtain the materials and nuclear data required to understand the physics of and validate nuclear weapons performance simulations. This data is acquired using unique, small- and large-scale experimental facilities associated with increasingly higher levels of complexity. They include hydrodynamic and subcritical experiments used to obtain data on the dynamic behavior of plutonium and surrogate materials in integrated geometries. These experiments and data analyses facilitate safety, security, and effectiveness evaluations of sustainment concepts without the need for underground testing. These activities also develop, exercise, and maintain the expertise and competence of the nuclear weapon design, engineering, and assessment community that resides at the National Nuclear Security Administration (NNSA) laboratories.

The Science program links directly to the Advanced Simulation and Computing (ASC), Inertial Confinement Fusion Ignition and High Yield (ICF), Engineering, and Directed Stockpile Work (DSW) programs. Science relies on advanced experimental facilities located at the national laboratories and security sites. The operational funds for these facilities are excluded in the Science program budget but are included in other program budgets such as ICF and Infrastructure and Operations.

Highlights of the FY 2018 Budget Request

The FY 2018 Request provides a significant increase in the Dynamic Materials Properties (DMP) subprogram. This increase supports an acceleration of the pace of subcritical experiment execution at the Nevada National Security Site underground laboratory complex (NNSS U1a), and supports changing the Authorization Basis of U1a from Hazard Category 3 to a Hazard Category 2 nuclear facility, which will facilitate the increased pace, as well as greater flexibility and relevance of subcritical experiments using plutonium (Pu).

As per congressional direction in the FY17 budget, NNSA has consolidated multiple investments under the new Enhanced Capabilities for Subcritical Experiments (ECSE) subprogram to focus activities, simplify multi-year planning and budgeting, and maintain best practices in project management in accordance with DOE O 413.3B. The consolidated subprogram constructs a new underground laboratory at the NNSS U1a Complex as well as diagnostic equipment in support of the subcritical experiments in relevant weapon geometries. Major investments include the Construction Line Item Project that constructs the necessary underground laboratory space (17-D-640, U1a Complex Enhancements Project - $158.6M TPC), the Advanced Sources and Detectors (ASD) Major Item of Equipment (MIE) that designs and implements a large radiographic system ($630M TPC), research and development of a neutron diagnostic platform, and readiness activities.

Focus areas for each of the subprograms are:

- **Advanced Certification** - Certification Readiness Exercises (CREs) designed to strengthen the NNSA weapon certification process for future LEPs and future stockpile designs as mandated by Congress to support; (1) developing robust tools for activities associated with weapon system assessments and certification including underground test data analysis and quantification of margin and uncertainties, (2) concepts for pit reuse designs, (3) advanced safety and security designs, (4) survivability concepts, and (5) designs of structural components using additive manufacturing (AM) and other advanced-manufactured materials for nuclear package components.

- **Primary Assessment Technologies** - (1) design and analysis of hydrodynamic experiments, (2) experiments supporting burn studies for boost science, (3) plutonium aging experiments supporting sustainment programs, and (4) work on manufacturing technologies to engineer and fabricate plutonium parts for Sub Critical Experiments (SCE).
- **Dynamic Materials Properties** - (1) perform focused experiments acquiring data on behavior of key stockpile materials, including Pu, in dynamic conditions, (2) partnering with other programs on the design, development, and execution of subcritical experiments, (3) execute two SCEs in support of upcoming sustainment programs, and (4) conduct work focused on new high explosive formulas.
- **Advanced Radiography** - develop next-generation accelerator components, diagnostics, and imaging systems in support of focused experiments, surrogate integrated weapons experiments, and sub-critical experiments. Advanced Radiography evolves pulsed power capabilities in support of NNSA radiographic systems, hostile testing environments and material pressure platforms; and sustains modeling, simulation, and analysis techniques and software that aids in analysis in the collected experimental data. Supported efforts are conducted across the NNSA complex at facilities such as Dual Axis Radiographic Hydrodynamic Test (DARHT) facility and proton radiography (pRad) at LANL, Flash X Ray (FXR) and the Contained Firing Facility (CFF) at LLNL, U1a Complex at NNSS, and Z at SNL.
- **Secondary Assessment Technologies** - focus on research and experimentation to understand weapon outputs, propagation (e.g., effects), and performance.
- **Academic Alliances and Partnerships** - support basic science research in subject areas relevant to the Stockpile Stewardship mission, develop a pipeline of graduates with expertise in disciplines of interest to NNSA and DOE national laboratories, and develop peer-to-peer interactions among the Academic Alliances and Partnerships programs.
- **Enhanced Capabilities for Subcritical Experiments** - develop advanced enabling diagnostics for SCEs. NNSA plans the ECSE effort to be complete in the mid-2020s timeframe to obtain experimental results from untested stockpile configurations involving plutonium reuse, insensitive high-explosive (IHE), and other modern configuration changes to support the sustainment program schedule. Additionally, NNSA agrees with the JASON study that ECSE "…may significantly reduce uncertainties that may arise in the future due to aging, or in certification of weapons through future life extension programs (LEPs) or alterations (ALTs), or through remanufacture or reuse of weapon components." Additionally, the NNSA's Stockpile Responsiveness Program will rely on enhanced experimental capabilities such as those provided by ECSE.

FY 2016 Accomplishments

- Advanced future LEP options through successful completion of the Secondary LEP Level 1 milestone, the initial Certification Readiness Exercises, and Los Alamos Neutron Science Center (LANSCE) experiments on additive manufacturing of new parts and the restoration of aged components.
- Designed and experimentally validated an additively manufactured component for future LEP applications, including the W80-4.
- Continued the multiple hydrodynamic experimental series at the DARHT facility and the CFF supporting pit reuse, advanced surety concepts, and to assess the design and modeling for LEP certification readiness.
- Published an updated 10-year boost science plan that integrates theoretical, computational, and experimental efforts in support of LEPs and stockpile modernization. Examined the primary performance impacts of features that arise due to birth defects, aging, and LEPs using the DARHT and LANSCE facilities. Executed an experiment at the Z facility to support the B61-12 LEP certification. The experimental data will be used to characterize the material property differences between new and aged plutonium. A second Z experiment used a recently developed shock ramp platform to provide plutonium data at higher pressures in regimes that previously were inaccessible. Completed a series of Joint Actinide Shock Physics Experimental Research (JASPER) experiments on encapsulated alpha plutonium targets that provided the most precise data on phase transitions to understand the properties of plutonium under nuclear weapon conditions. Delivered plutonium phase data and strength data at the high-pressure regimes previously only accessible through models and theories. Previously achieved in 1998, re-acquired improved double pulse radiographic images at the Flash X-Ray (FXR) accelerator, which is a 1970s accelerator that was a forerunner to DARHT and slated a decade ago for dismantlement in NNSA's Complex 2030 Plan. This double-pulse achievement may be part of the next technology advance for hydrodynamic experiments to support upcoming LEP design options. Made significant advances at the Z facility in developing test platforms for warm x-rays (10-100 keV) and >1 MeV neutron sources.

Science
Funding

(Dollars in Thousands)

	FY 2016 Enacted	FY 2017 Annualized CR*	FY 2018 Request	FY 2018 vs FY 2016
Research, Development, Test and Evaluation (RDT&E)				
Science				
Advanced Certification	58,747	58,747	57,710	-1,037
Primary Assessment Technologies	95,512	95,512	89,313	-6,199
Dynamic Materials Properties	100,400	100,400	122,347	+21,947
Advanced Radiography	45,700	50,500	37,600	-8,100
Secondary Assessment Technologies	72,900	72,900	76,833	+3,933
Academic Alliances and Partnerships	49,800	49,800	52,963	+3,163
Enhanced Capabilities for Subcritical Experiments	0	0	50,755	+50,755
Total, Science	**423,059**	**427,859**	**487,521**	**+64,462**

* The FY 2017 Annualized CR amounts reflect the P.L. 114-254 continuing resolution level annualized to a full year. These amounts are shown only at the congressional control level and above, below that level, a dash (-) is shown.

Science
Explanation of Major Changes
(Dollars in Thousands)

	FY 2018 vs FY 2016
Science	
Advanced Certification: Supports diagnostic complexity of hydrodynamic experiments for upcoming sustainment programs/options	-1,037
Primary Assessment Technologies: Increase continues (1) plutonium aging efforts and (2) burn and boost studies, offset by movement of NDSE scope to the ECSE subprogram	-6,199
Dynamic Materials Properties: Increase supports (1) implementation of new SCE platforms in support of LEPs and (2) characterization of key materials including plutonium, additively-manufactured materials, and new high explosive formulations	+21,947
Advanced Radiography: Decrease reflects movement of the ASD MIE, UCEP OPCs, and readiness scope to the ECSE subprogram	-8,100
Secondary Assessment Technologies: Increase supports research in x-ray source development and modeling for radiation flow, opacity, and outputs and effects	+3,933
Academic Alliances and Partnerships: Increase supports grants and cooperative agreements for basic science research relevant to the stockpile stewardship mission	+3,163
Enhanced Capabilities for Subcritical Experiments: Reflects the establishment of this subprogram from consolidated investments into a single subprogram	+50,755
Total, Science	**+64,462**

Science
Advanced Certification

Description

Advanced Certification focuses on facilitating certification activities for the future stockpile in the absence of nuclear testing that are carried out, in part, by integrating advances achieved across the Science program. This subprogram develops tools and methods that support assessment activities associated with the current stockpile as well as certification of future, complex stockpile options with new safety and security features. Advanced Certification, therefore, provides a strong focal point for key science, technology, and engineering deliverables that facilitate future life extension certification activities. The subprogram integrates scientific and technological advances that are supported elsewhere in the science-based Stockpile Stewardship Program (Science, ASC, and ICF), with input from continuing studies in order to: (1) understand impacts of materials behavior and design options on weapon performance, (2) enhance the weapons certification process, (3) refine computational tools and methods, (4) advance the physical understanding of surety mechanisms, (5) understand failure modes (6) assess new manufacturing processes, (7) deliver design options to support future life extension programs, and (8) provide rapid support to stockpile needs.

Advanced Certification

Activities and Explanation of Changes

FY 2016 Enacted	FY 2018 Request	Explanation of Changes FY 2018 vs FY 2016
Advanced Certification $58,747,000	**Advanced Certification $57,710,000**	**Advanced Certification -$1,037,000**
• Execute mandate to strengthen certification process and tools to support weapon assessment and certification activities by developing method for quantifying predictive uncertainty • Conduct peer review to complete Certification Readiness Exercises (CREs) for sustainment options with advanced-manufactured materials Demonstrating the certification potential of components made from AM processes • Execute hydrodynamic experiments to obtain data to support CREs for upcoming sustainment options Incorporating features • Initiate exercises to explore other safety options • Initiate activities to investigate design options to address responsiveness of the stockpile and emerging stockpile requirements • Conduct small-scale experiments to assess and mature the design options for advanced surety concepts and AM structural components • Develop a method for assessing certification challenges for secondary design options • Conduct experiments and analyses to characterize the high-pressure behavior of a key surety material	• Continue to execute mandate to improve and strengthen certification path and assessment tools with new experimental data • Improve predictive capability with common model development and resolution of failure modes • Analyze hydrotest data to assess the feasibility of the design under investigation • Continue to mature the development of AM structural component and execute small-scale hydrotest to assess the feasibility of such design • Continue to mature other safety options with small-scale experiments and refine design concepts for possible use in future stockpile options • Continue to develop method for assessing certification challenges for secondary design options and outline path forward • Explore nuclear package design concepts to support responsive stockpile effort	• Explore design concepts supporting rapid response to stockpile needs • Accomplish CRE subsystem tests and hydrotests to validate stockpile design simulations and to retain engineering and design skills

Science
Primary Assessment Technologies

Description

Primary Assessment Technologies provides capabilities needed for annual assessment of stockpile primaries, design and certification of future sustainment programs, improvements in primary safety and security, and for resolving significant finding investigations (SFI). A key focus involves the rigorous acquisition of fundamental nuclear science data, such as fission cross sections and prompt fission neutron spectra (PFNS). These data address removal of compensating errors in simulations, resulting in improved margins and uncertainties supporting the stockpile annual assessment. Further, these data enable improved understanding of initial conditions for boost, outputs, and effects. A principal focus of Primary Assessment Technologies in the outyears will be to continue developing predictive capabilities for modeling boost, a process key to proper functioning of the weapon. Another principal focus is on providing the capability to assess impacts of plutonium aging (including corrosion processes), and changes associated with stockpile sustainment programs, such as reuse of components and the incorporation of safety changes (e.g., use of IHEs). The aging program includes theory, modeling, and simulations along with fundamental measurements of aged-plutonium alloys to incorporate and evaluate aging effects. Primary Assessment Technologies also provides science capabilities needed for intelligence community assessments of foreign-state nuclear weapon activities that also results in providing critical weapon skills, training, and experimental opportunities for designers and engineers not provided in typical Directed Stockpile Work (e.g., LEPs).

There are three major Predictive Capability Framework (PCF) milestones within Primary Assessment Technologies planned between 2018 and 2024: 1) primary performance via nominal conditions, 2) off-nominal conditions, and 3) microstructure. These assessments are driven by the need to ensure predictive capabilities build upon established capabilities by developing common models to quantify uncertainties in predictions, as well as models to assess the impact of variabilities caused by engineering, aging, or manufacturing features.

Primary Assessment Technologies

Activities and Explanation of Changes

FY 2016 Enacted	FY 2018 Request	Explanation of Changes FY 2018 vs FY 2016
Primary Assessment Technologies $95,512,000	**Primary Assessment Technologies $89,313,000**	**Primary Assessment Technologies -$6,199,000**
• Support the Enhanced Capabilities for Subcritical Experiments (ECSE) effort to achieve a diagnostic suite to obtain plutonium data from SCEs that will inform models of the performance of the modern stockpile • Conduct experiments in support of boost science to answer outstanding questions with respect to primary performance • Deliver the design and diagnostic requirements for focused experiments supporting burn studies. • Issue the design release for the first dynamic Neutron Diagnosed Subcritical Experiment (NDSE) and carry out required engineering development • Assess the capability for a combined mix and strength model to improve modern codes of the performance of weapon primaries • Conduct plutonium aging experiments supporting the B61, the annual assessment review, and pit reuse options • Characterize the initial conditions of several device configurations and assess the impacts of the initial conditions to primary performance • Perform IHE component qualification and characterization associated with weapon safety • Initiate the engineering and fabrication of plutonium parts for upcoming SCEs in collaboration with Plutonium Sustainment	• Conduct plutonium aging experiments in support of the B61 LEP, annual assessments, and to support pit reuse options for sustainment programs • Complete the Keystone series of high explosive initiation tests • Characterize the initial conditions of several device configurations and assess the impacts of initial conditions on primary performance • Advance the capability for a combined mix and strength model to improve modern codes that predict the performance of weapon primaries • Conduct experiments in support of boost science to improve the current understanding of primary performance • Demonstrate the readiness of a ramp compression platform at the National Ignition Facility (NIF) • Engineer and fabricate plutonium parts for upcoming SCEs in collaboration with Plutonium Sustainment • Develop and execute time-resolved, x-ray diffraction measurements on dynamically compressed, polycrystalline matter at the Z Facility (Dynamic X-Ray Diffraction)	• Continued emphasis on boost science, plutonium aging, high explosive initiation characterization, and support for NDSE and SCEs • Moves Neutron Diagnostics for Subcritical Experiments scope to Enhanced Capabilities for Subcritical Experiments subprogram

Science
Dynamic Materials Properties

Description

Dynamic Materials Properties subprogram develops and maintains the experimental capabilities needed to inform modern, physics-based models that describe and predict the behaviors of weapon materials in environments of extreme conditions of pressure, temperature, stress, strain, and strain rates to understand how the behavior impacts nuclear weapon performance. This program provides the experimental data and essential materials knowledge required for annual assessment and certification of the stockpile and to inform future sustainment options. The materials of interest include plutonium, uranium, high explosives, and other materials used in nuclear weapons. Surrogate materials are used to aid understanding and develop data without the use of special nuclear materials. They are also used for the development and qualification of advanced diagnostics prior to fielding more complex and costly experiments on nuclear materials. It is essential to continue to invest in understanding the properties and performance of special nuclear materials, IHE, polymers, and foams to address future design options and manufacturing processes for sustainment programs. New experimental capabilities are developed as required to provide the needed data and to support the interpretation of the data. This subprogram is coordinated closely with the other Science subprograms and the ASC, DSW, Major Modernization program, and the Department of Defense (DOD)-DOE Joint Munitions Program.

Required experiments are conducted at laboratory facilities, including PF-4 at TA-55, the Z-machine, U1a, the Advanced Photon Source (APS), Los Alamos Neutron Science Center (LANSCE), Joint Actinide Shock Physics Experimental Research (JASPER) facility, other gas and powder gun facilities, as well as small-scale laboratories for testing and characterization. Assessing the use of IHE in weapons systems that were originally designed to use conventional high explosives and for understanding the effects of processing on production consistency and performance. The consideration of pit and secondary component reuse and replacement also requires materials study prior to qualification and certification. Key materials data on polymers, foams, and other similar materials will be generated, analyzed, and incorporated into models. These materials often demonstrate aging degradation and, therefore, could result in potential performance changes. DMP also provides critical materials data to monitor plutonium aging and to address impacts to weapon performance due to new manufacturing processes. Environmental regulations and replacement material availability drive the requirement to evaluate and baseline potential new materials for critical nuclear weapons applications.

Research pursued in the Dynamic Materials Properties subprogram is used to support: (1) the annual assessment process, (2) baselining materials properties for the future determination of aging effects, and (3) considering materials replacement and future options for sustainment programs. The characterization of new materials and processes for stockpile applications, referred to as “production science,” is an emerging concern for modernization. Dynamic Materials Properties is one of the two substantial funding sources (along with Research and Development Certification and Safety within DSW) for subcritical and other plutonium experiments. This subprogram includes the major experimental capabilities devoted specifically to obtaining data on plutonium and other weapons materials under extreme conditions in an integrated assembly. New experimental capabilities are developed as needed to provide the required data for annual assessment and potential future sustainment options. In particular, the following are required to facilitate certification of pit reuse with IHE for upcoming sustainment programs: (1) subcritical experiments using radiography, radiometry, holography, and/or Photon Doppler Velocimetry (PDV) diagnostic, (2) heating and cooling capabilities on dynamic testing platforms, (3) high-pressure Z experiments on plutonium and other relevant materials, and (4) the development of the Phoenix platform, JASPER, and other experimental platforms such as ECSE and the Matter Radiation Interactions in Extremes (MaRIE) capability.

Dynamic Materials Properties

Activities and Explanation of Changes

FY 2016 Enacted	FY 2018 Request	Explanation of Changes FY 2018 vs FY 2016
Dynamic Materials Properties $100,400,000	**Dynamic Materials Properties $122,347,000**	**Dynamic Materials Properties +$21,947,000**
• Execute Eurydice confirmatory experiment (Lyra series) at U1a site • Resolve the dominant physics and chemistry mechanisms involved with high-explosive initiation to inform next generation burn models • Obtain data on key characteristics of plutonium by performing experiments at JASPER, Z, and TA-55 • Execute a high-Z experimental series at NIF to obtain key data on high-Z materials of interest • Assess AM versus conventionally manufactured metals and alloys to inform strength models and to assess how accurately the current strength models are accounting for AM materials • Evaluate new IHE formulas to assess initiation characteristics, detonation, and to inform next generation burn models • Complete the final design review for the Generation II 6-ft. containment vessel needed for future SCEs supporting upcoming sustainment options • Develop and field advanced diagnostics to probe detonation velocity of HE (microwave interferometry), temperature (pyrometry), and phase change of metals for use under dynamic and shock loading conditions	• Conduct the Vega SCE (Lyra series) at U1a • Update the Authorization Basis at U1a to support the upcoming SCEs in the Sierra Nevada and Red Sage series • Continue development and authorization of next-generation containment (NGC) system for the Z facility • Compile tantalum strength measurements obtained from different experimental approaches for cross-platform comparisons • Continue development of and field advanced diagnostics for temperature (pyrometry) and phase change of metals for use under static and dynamic conditions • Place order for the 6-ft vessels for upcoming SCEs; complete Lot 2 of 3-ft vessels; and place order for Lot 3 of 3-ft vessels for upcoming SCEs • Carry out initial set of materials experiments on THOR • Complete equation-of-state and phase mapping of plutonium at low pressure and moderate temperature • Complete high temperature, off-Hugoniot equation-of-state to help address plutonium aging and pit remanufacture issues • Conduct experiments at the Advanced Photon Source (APS) Dynamic Compression Sector (DCS) to elucidate the formation of high explosive condensates during initiation to inform reactive burn models • Conduct qualifications of IHE in support of on-going sustainment programs	• Supports gradual acceleration and authorization basis to conducting two SCEs per year • Supports completion of CD-0 approval for the MaRIE project

FY 2016 Enacted	FY 2018 Request	Explanation of Changes FY 2018 vs FY 2016
	• Conduct the Lamarck confirmatory experiment (Sierra Nevada series) at U1a • Develop and characterize additively-manufactured explosives • Begin analysis of alternatives for the MaRIE project	

Science
Advanced Radiography

Description

Developing predictive capabilities for stockpile stewardship in the absence of nuclear testing relies on the development of advanced platforms and diagnostics to facilitate and improve the reliable and repeatable measurement of experiments. These capabilities address SFIs and technology assessment system certification for LEPs in the execution of sustainment programs. Advanced Radiography develops technologies and diagnostics that support experimental activities that NNSA funds primarily within Primary Assessment Technologies, Dynamic Material Properties, Advanced Certification, and DSW. This includes sources, targets, and imaging systems used to diagnose hydrodynamic and subcritical experiments, and the development of platforms and diagnostics for other dynamic material properties experiments, including those that study plutonium properties. These transformational technologies improve the quality and reliability of scientific results at many NNSA experimental facilities at the national security laboratories, and NNSS. These include the Dual-Axis Radiographic Hydrodynamic Test (DARHT) facility, Contained Firing Facility using Flash X-Ray (FXR) technology, Z pulsed power facility, Cygnus radiography system at the U1a Complex, and Proton Radiography (pRad) at the Los Alamos Neutron Science Center (LANSCE).

Advanced Radiography

Activities and Explanation of Changes

FY 2016 Enacted	FY 2018 Request	Explanation of Changes FY 2018 vs FY 2016
Advanced Radiography $45,700,000	**Advanced Radiography $37,600,000**	**Advanced Radiography -$8,100,000**
• Execute experiments to develop Neutron Diagnosed Subcritical Experiment (NDSE) technology • Achieve CD-1 for the U1a Complex Enhancements Project (UCEP) • Evaluate prototype Dense Plasma Focus system in support of NDSE • Complete research and development for an ECSE radiographic system • Execute an experimental series to characterize a next generation multi-pulse accelerator injector for use with ECSE radiographic system • Complete prototype for a Thor pulsed power system • Establish models for ECSE radiography and NDSE components and systems	• Through use of simulation, modeling tools, and prototypes develop next-generation prime power energy storage, pulsed power, and current adder technology • Advance hydrodynamic diagnostics for both surrogate and plutonium experiments • Design the next-generation x-ray and proton imaging systems • Modernize radiographic analysis techniques and models based on experimental results	• Move the ASD MIE, UCEP OPCs, and readiness scope to the ECSE subprogram

Secondary Assessment Technologies

Description

The Secondary Assessment Technologies subprogram provides capabilities that increase confidence in the assessment of stockpile secondaries, enabling a broad range of sustainment options and resolution of SFIs. A principal focus of Secondary Assessment Technologies is to provide the experimental and science predictive capability used to quantify full system performance margins and associated uncertainties. The subprogram uses past UGT data and conducts and utilizes a variety of above ground experiments to obtain new data and to develop and validate physical models needed to improve and to increase confidence in predictive capability. Key elements include primary output, radiation flow, complex hydrodynamics and burn, material properties, and weapons outputs and effects. For stockpile systems, this assessment facilitates: (1) the reacceptance of existing secondaries and other nuclear explosive package components for future sustainment options and (2) the development of the qualification methodology science basis for physics performance of remanufactured canned sub-assembly (CSA) components. Understanding the impact of manufacturing processes for the production and restoration of CSA components requires both experimental measurements and modeling techniques to address performance impacts and is a growing area of the subprogram. A major deliverable for Secondary Assessment Technologies is the improved predictive capability for secondary performance for nominal and off-nominal conditions. This will be delivered as a level-1 pegpost in FY 2019. A focus of the subprogram that will increase in the outyears is weapon outputs, effects, and performance in hostile environments. Understanding survivability in a hostile environment requires understanding weapon outputs, propagation of outputs, and the subsequent effects coupling into the weapon intended for survival and how the performance of the weapon is impacted. This research includes obtaining experimental data supporting weapon design code validation for more accurate weapon output calculations, improving laboratory radiation sources and diagnostics to support code validation and hardware qualification experiments, and developing platforms for evaluating candidate and evolving stockpile technologies for radiation hardness.

Secondary Assessment Technologies has strong programmatic coupling with other subprograms within Science and the HED facilities supported by both the Science and ICF programs, including the National Ignition Facility (NIF), the Omega Laser Facility at the University of Rochester, and the Z facility at Sandia National Laboratories, and has significant coupling to advanced computing platforms supported by the ASC Program and with the Nuclear Survivability subprogram in the Engineering program.

Secondary Assessment Technologies

Activities and Explanation of Changes

FY 2016 Enacted	FY 2018 Request	Explanation of Changes FY 2018 vs FY 2016
Secondary Assessment Technologies $72,900,000	**Secondary Assessment Technologies $76,833,000**	**Secondary Assessment Technologies +$3,933,000**
• Mature and execute plans for the 2019 Secondary Performance pegpost, delivering an advanced predictive capability for secondary performance in nominal and off-nominal conditions • Execute NIF opacity experiments with iron and continue the Z opacity experimental series. Review and update the multi-year Opacity Plan • Assess initial conditions of weapon secondaries and compare with performance models • Begin addition of alternate code, full-system simulation results to the secondary validation suite • Collect experimental data and infer the cross section of neutron-induced reactions important to radiochemical analysis • Assess impact of body of work on radiation flow • Conduct radiation effects sciences measurements using a >15 keV x-ray source on Z and further development of warm x-ray sources • Complete beam line transition activities at SSRL. Provide calibration support and develop new calibration methods, sources, and diagnostics to support HED experiments at NIF, Omega, and Z	• Execute plan for the 2019 Secondary Performance pegpost, delivering data and applying the broad simulation suites to assess the ability to model and predict secondary performance in nominal and off-nominal conditions • Deliver data on radiation transport to validate models in support of LEP design assessments and for the Annual Assessments • Execute plans and obtain data on developed HED hydrodynamic and burn platforms in relevant-driven configurations • Execute the multi-year Opacity Plan with a focus on acquiring data on NIF and Z to resolve model-data discrepancies and advancing the Orion platform • Develop a very high-pressure platform for equation-of-state studies on NIF • Develop a surrogate cross section measurement technique and evaluate experimental measurements and impacts on theory • Compare radiochemistry analysis methods and the impact of differences on modeling • Mature models and develop radiation sources and experimental methods to understand weapon outputs, effects, and performance in a hostile environment • Develop strategic plan to deliver full system weapon outputs modeling capabilities in preparation for 2022 Secondary Performance pegpost	• Increase supports research in x-ray source development related to U.S. nuclear weapon performance in hostile environments including survivability platform capability for higher energy (>15 keV) x-ray sources at the Z facility • Increase supports theoretical effort and experimental program at HED facilities for opacity, radiation flow, and outputs and effects

FY 2016 Enacted	FY 2018 Request	Explanation of Changes FY 2018 vs FY 2016
	• Operate x-ray beamline at SSRL and complete build and commissioning of HXR branch. Provide calibration support and develop new calibration methods, sources, and diagnostics to support HED experiments at NIF, Omega, and Z	

Science
Academic Alliances and Partnerships

Description

The Academic Alliances and Partnerships subprogram funds academic programs to develop NNSA's next-generation technical workforce. Congress established this subprogram in the Consolidated Appropriations Act, 2016, consolidating the Site Stewardship Minority Serving Institutions Partnership Program (MSIPP) and the Stewardship Science Academic Alliance (SSAA) program within a new subprogram in Science. Combining the programs into a single subprogram will improve the effectiveness of the stewardship of these programs and will encourage additional partnerships among the minority serving institutions and the broader scientific community and the national laboratories.

(dollars in thousands)

Budget Category	FY 2016 Enacted	FY 2017 Annualized CR	FY 2018 Request
Science			
Academic Alliances and Partnerships	**49,800**	**49,800**	**52,963**
Minority Serving Institution Partnership Program	16,500	16,500	18,832
Stewardship Science Academic Alliance (SSAA) Grants and Cooperative Agreements	33,300	33,300	34,131

NNSA funds scientific academic programs to develop the next generation of highly trained technical workers able to support its core mission and to ensure there is a strong community of technical peers, external to the NNSA national laboratories, capable of providing peer review and scientific competition to strengthen the basic fields of research relevant to the NNSA. Within Science, the Academic Alliances and Partnerships subprogram supports the following academic programs: (1) Stewardship Science Academic Alliance (SSAA) and (2) Minority Serving Institutions Partnership Program (MSIPP).

The SSAA program funds research projects at universities that conduct fundamental science and technology research of relevance to stockpile stewardship (materials under extreme conditions, low-energy nuclear science, high energy density physics, and radiochemistry). Launched in 2002, the SSAA Program enables advanced experimental activities through program-supported Centers of Excellence and research grants at over 40 universities. The program supports students in the aforementioned fields critical to stewardship science including opportunities to conduct research at NNSA's laboratories, building a field of talented and committed doctoral students sharing a common desire to advance science while impacting national security.

MSIPP aligns investments in university capacity and workforce development with the NNSA mission to develop the needed skills and talent for NNSA's enduring technical workforce at the laboratories and production plants, and to enhance research and education at under-represented colleges and universities. This alignment is defined by the following goals: 1) strengthen and expand Minority Serving Institutions' (MSI) capacity and research experience in NNSA/DOE mission areas of interest, 2) increase visible participation of MSI faculty in NNSA/DOE technical engagements and activities, such as collaborative research, technical workshops, expert panel reviews and studies, and competitive processes, 3) target collaborations between MSIs and NNSA/DOE laboratories and plants that increase scientist-to-scientist interactions, applied research and engineering application collaborations and/or implementation of research results, and provide MSI access to NNSA/DOE facilities, 4) increase the number of MSI students who graduate with Science, Technology, Engineering, and Mathematics (STEM) degrees relevant to DOE mission areas and who have had exposure to career opportunities at DOE, and 5) increase the number of minority graduates and post-doctoral students hired into NNSA/DOE's technical and scientific workforce.

NNSA MSIPP is designed to increase participation of women and minorities in the nuclear security enterprise and across the nation in STEM disciplines, developing individuals, building core competencies for NNSA, and improving institutional capacity in MSIs. MSIPP supports MSI efforts including Historically Black Colleges and Universities (HBCUs), Hispanic Serving Institutions (HSIs), and Tribal Colleges and Universities (TCUs).

Academic Alliances and Partnerships

Activities and Explanation of Changes

FY 2016 Enacted	FY 2018 Request	Explanation of Changes FY 2018 vs FY 2016
Academic Alliances and Partnerships $49,800,000	**Academic Alliances and Partnerships $52,963,000**	**Academic Alliances and Partnerships +$3,163,000**
• Supports for the MSI Program formerly known as the Massie Chairs Program. New and continued support to HBCU, HSI, TCU, and community-based grants. MSIPP consortium based model focused on research and internships in STEM. Building educational/institutional infrastructure, and enhancing the pipeline of diverse, high quality talent in STEM academic disciplines and careers. • Support the SSAA Program. • Increase emphasis in advanced experimental measurement techniques supportive of NNSA's core mission areas.	• Supports the MSIPP with new and continued support to the HBCU, HSI, TCU and community-based grants. Supports the MSIPP consortium based model focused on research and internships in STEM. Supports building educational/institutional infrastructure and enhancing the pipeline of diverse, high-quality talent in STEM academic disciplines and careers. • Supports the SSAA Program	• Increase supports STEM development initiatives at key institutions and builds pipeline of talent in unique skill sets required by the nuclear weapons enterprise

Science
Enhanced Capabilities for Subcritical Experiments

Description

In 2014, the national security laboratories LANL, LLNL, SNL, and the NNSS jointly identified a significant gap in the capabilities available to meet the responsibilities of the science-based SSP; NNSA lacks the ability to diagnose the final stages of a subcritical primary implosion using plutonium. Science efforts have advanced the understanding of plutonium in the early evolution of an imploding system and identified the need to similarly improve understanding of plutonium performance during the extreme physical conditions reached later in an implosion. This improved understanding will inform certification and evaluation of various components of stockpile transformation, but is not possible given the limitations of existing facilities and diagnostic methods. In addition to the physics gap, the national laboratories have identified a gap in experimental capabilities needed to develop the next generation of weapon designers in the absence of underground nuclear testing. To fill these gaps and to support the program plan documented in the 2017 SSMP, NNSA places a high priority on developing enhanced capabilities for subcritical experiments (ECSE) at NNSS's underground laboratory, the U1a Complex. Additionally, the NNSA's Stockpile Responsiveness Program will rely on enhanced experimental capabilities such as those provided by ECSE. This enhanced capability is planned to be operational in the mid-2020 timeframe for use by the laboratory weapon design community.

<u>The17-D-640, U1a Complex Enhancements Project (UCEP) Nevada National Security Site (NNSS) Project Mission Need states:</u> "In 2014, the national security laboratories LANL, LLNL, SNL, and the NNSS jointly identified a significant gap in the capabilities available to meet the responsibilities of the science-based Stockpile Stewardship Plan." In 2016, the JASONs Defense Advisory Group identified the same gap in current U.S. capability to carry out and diagnose such experiments. This gap focuses on aging in the stockpile and certification decisions for possible future stockpile options.

The ECSE subprogram consolidates the line item construction project, 17-D-640 U1a Complex Enhancements Project (UCEP), an advanced multi-pulse radiography machine funded as a Major Item of Equipment (MIE), denoted as Advanced Sources and Detectors (ASD), and supporting science and diagnostic development efforts. UCEP delivers a new underground laboratory that enables new experimental and diagnostic capabilities and an increased operational cadence of subcritical weapons experiments using plutonium. The project provides both mining operations and installation of the necessary supporting structures, systems and components. Existing U1a Complex orthogonal U1a 100 and U1a 104 drifts will be used to minimize the need for new mining. In FY 2017, UCEP was funded under Infrastructure and Operations. ASD delivers a radiographic diagnostic that is a radiographic system generating the x-ray energies and multi-pulse capability necessary to diagnose late-time dynamics in plutonium experiments. In FY 2017, funding for development of the ASD was authorized under the Advanced Radiography subprogram. Other consolidated efforts include research and development of a future diagnostic called Neutron Diagnosed Subcritical Experiments (NDSE) and readiness activities.

As outlined in the National Nuclear Security Administration (NNSA) 2017 Stockpile Stewardship and Management Plan, NNSA plans long-term investments supporting plutonium science at the NNSS. NNSS is the only site in the United States with the capability to perform experiments combining high explosives and plutonium, a core capability for NNSA's Stockpile Stewardship Program, as per 50 U.S. Code§ 2521.

Activities captured under the ECSE subprogram include:

	(dollars in thousands)				
	FY 2018	**FY 2019**	**FY 2020**	**FY 2021**	**FY 2022**
U1a Complex Enhancement Project (UCEP) Construction in I&O Program (TEC)	**22,100**	**63,000**	**35,000**	**19,900**	**0**
ESCE Program funded Operating Investments in					
UCEP OPC	1,000	800	0	0	0
Advanced Sources and Detectors MIE	34,355	30,717	35,120	21,037	20,853
Neutron Diagnosed Subcritical Experiments R&D	10,200	9,000	9,000	9,000	8,200
Readiness Activities	5,200	11,100	8,200	3,000	3,600
Total ECSE	**72,855**	**114,617**	**87,320**	**52,937**	**32,653**

Enhanced Capabilities for Subcritical Experiments

FY 2016 Enacted	FY 2018 Request	Explanation of Changes FY 2018 vs FY 2016
Enhanced Capabilities for Subcritical Experiments **$0**	**Enhanced Capabilities for Subcritical Experiments** **$50,755,000**	**Enhanced Capabilities for Subcritical Experiments** **+$50,755,000**
• This project consolidates efforts included in FY 2016 under the Infrastructure and Operations and Science programs	• Achieve CD-1 for the Major Item of Equipment, ASD • Complete the proof-of-principle static experiments for the Dense Plasma Focus (DPF) diagnostic in support of NDSE	• This increase reflects the first year of funding as a consolidated subprogram

Science
Performance Measures

In accordance with the GPRA Modernization Act of 2010, the Department sets targets for, and tracks progress toward, achieving performance goals for each program.

	FY 2016	FY 2017	FY 2018
Performance Goal (Measure)	**Experimentally Validated Physics Models -** Cumulative percentage of progress in delivering an experimentally validated physics-based capability to enable assessment of weapon performance with quantified uncertainties, replacing key empirical parameters in the nuclear explosive package.		
Target	84 % of progress	N/A	N/A
Result	Met - 84	TBD	TBD
Endpoint Target	By the end of FY 2020, use modern physics models in assessment calculations to replace the major empirical parameters affecting weapon performance. This activity is performed in collaboration with the Internal Confinement Fusion (ICF) Campaign.		
Performance Goal (Measure)	**Science-Based Capabilities -** Provide the science-based capabilities necessary to support stockpile certification on an annual basis.		
Target	N/A	100 % of progress	100 % of progress
Result	N/A	TBD	TBD
Endpoint Target	Each year provide the science-based capabilities (e.g., experimental infrastructure, assessment and certification methodologies, experiments, data, and analyses) to enable the annual assessment and certification of the stockpile including certification of LEPs and weapon modifications.		

Note: NNSA replaced the Experimentally Validated Physics Models performance measure with the Science-Based Capabilities performance measure to reflect the refocusing of the Science program away from tuning weapon performance codes to providing the scientific capabilities needed to assess and certify the stockpile and to enable LEPs.

Science
Capital Summary

	Total	Prior Years	FY 2016 Enacted	FY 2016 Current	FY 2017 Annualized CR*	FY 2018 Request	FY 2018 vs FY 2016	Outyears to Completion
	(Dollars in Thousands)							
Capital Operating Expenses Summary including (Major Items of Equipment (MIE))								
Capital Equipment >$500K (including MIE)	N/A	N/A	16,221	16,221	13,347	40,331	+24,110	N/A
Plant Projects (GPP and IGPP)	N/A	N/A	0	0	0	0	0	N/A
Total, Capital Operating Expenses	**N/A**	**N/A**	**16,221**	**16,221**	**13,347**	**40,331**	**+24,110**	**N/A**
Capital Equipment > $500K (including MIE)								
Total Non-MIE Capital Equipment	N/A	N/A	5,721	5,721	5,847	5,976	+255	N/A
Advanced Sources and Detectors, NNSS	510,400	10,500	10,500	10,500	7,500	34,355	+23,855	447,545
Total, Capital Equipment (including MIE)	**N/A**	**N/A**	**16,221**	**16,221**	**13,347**	**40,331**	**+24,110**	**447,545**
Plant Projects (GPP and IGPP)								
Total Plant Projects (GPP/IGPP) (Total Estimated Cost (TEC) <$5M)	N/A	N/A	0	0	0	0	0	N/A
Total, Plant Projects (GPP/IGPP)	N/A	N/A	**0**	**0**	**0**	**0**	**0**	N/A
Total, Capital Summary	**N/A**	**N/A**	**16,221**	**16,221**	**13,347**	**40,331**	**+24,110**	**N/A**

* The FY 2017 Annualized CR amounts reflect the P.L. 114-254 continuing resolution level annualized to a full year. These amounts are shown only at the congressional control level and above, below that level, a dash (-) is shown.

Engineering

Overview

The Engineering Program is responsible for creating and maturing advanced toolsets and capabilities necessary to maintain a safe, secure, and effective nuclear weapons stockpile and enhance nuclear weapon safety, security, and use-control. This Program directly supports three key mission areas discussed in the 2010 *Nuclear Posture Review Report:* (1) strengthening the science, technology, and engineering base by maturing advanced technologies to improve weapon surety; (2) providing tools for qualifying weapon components and certifying weapons without underground testing; and (3) supporting annual stockpile assessments through improved weapons surveillance technologies and warhead component aging assessments. Primary responsibilities of this program include:

- Assessing nuclear and non-nuclear components without underground testing;
- Maturing technologies necessary for maintaining the current stockpile and advancing the future stockpile capabilities through insertions in Life Extension Programs (LEPs);
- Providing fundamental, sustained engineering research and development for stockpile assessment and certification throughout the lifecycle of each weapon;
- Providing the ability to predict the response of weapon components and subsystems to aging, normal, abnormal and hostile environments;
- Advancing components and materials testing processes to minimize destructive effects while ensuring high-level weapon reliability and certification;
- Maturing enhanced technologies that both minimize probability of unauthorized use and maximize reliability for authorize use; and
- Demonstrating and strengthening the spectrum of capabilities required for a responsive, safe and effective U.S. nuclear deterrent.

The Engineering Program is comprised of five subprograms:

1. **Enhanced Surety:** Provides advanced safety, use-control, and integrated surety solutions for insertion into stockpile weapon systems and venues. Enhanced Surety develops and matures viable technology options that seek to improve safety, security, and use-control of the U.S. nuclear deterrent.

2. **Weapons Systems Engineering Assessment Technology (WSEAT):** Provides experimental capabilities, diagnostics, and data needed for assessing that weapons will not be damaged by delivery environments and will be robust to possible accidents.

3. **Nuclear Survivability:** Provides the tools and technologies necessary for ensuring that U.S. weapons meet Department of Defense (DOD) requirements for surviving encounters with adversary defenses.

4. **Enhanced Surveillance:** Provides diagnostics and the science needed to ensure that aging will not harm the stockpile.

5. **Stockpile Responsiveness:** Provides, in collaboration with the DOD, efforts that sustain, enhance, and exercise capabilities required to conceptualize, study, design, develop, engineer, certify, produce, and deploy nuclear weapons to ensure the U.S. nuclear deterrent remains safe, secure, reliable, credible, and responsive.

Highlights of the FY 2018 Budget Request

- Maintain emphasis on the immediate needs of the Directed Stockpile Work program.
- Test and evaluate technologies for multi-venue Integrated Surety Solution (ISS) implementation for Air Force systems.
- Continue development of improvements to stronglinks, weaklinks, firing systems, and high explosive initiation systems to improve nuclear detonation safety in future life extension programs.

- Address environmental testing, engineering tools, and technical capabilities based on DOD requirements associated with evolving delivery system design, qualification, and production.
- Release validation data on required weapon systems internal and external intrinsic radiation environments.
- Investigate non-nuclear survivability options and capabilities with the DOD and the United Kingdom (UK).
- Reach Critical Decision-1 (CD-1) for a capability to provide trusted microelectronics for the future stockpile.
- Implement the Stockpile Responsiveness Program as established in the FY 2016 National Defense Authorization Act (NDAA).
- Establish initial design and development of the trusted strategic radiation-hardened microelectronics capability.

FY 2016 Accomplishments

Enhanced Surety:

- Utilized recently established x-ray computerized tomography techniques to discover significant technical findings that promise increased manufacturing yields and cost savings for the Highest Priority Mechanical Component. (SNL)
- Designed and tested first functional prototype of surety module that will enable Integrated Surety Solution implementation in an Air Force Launch Facility or Payload Transport. (SNL)
- Performed advanced use control technology qualification testing on schedule to meet the B61-12 LEP needs. This B61-12 qualification testing also benefits computer codes used for future qualification and surveillance. (LANL)
- Completed full system compatibility system tests, assembled test chambers, and installed test objects for the first deployment of multi point safety (MPS) full-scale compatibility. (LLNL)

Weapons System Engineering Assessment Technology:

- Developed a report *Understanding Capabilities and Gaps in Reentry Vehicle Flight Dynamics Modeling and Testing* to ensure evolving weapon flight environments are addressed in the next 10 years. (LANL, LLNL, SNL)
- Implemented and exercised a Los Alamos developed physics-based high explosives kinetics model in simulations of a variety of experiments. (LANL)
- Advanced diagnostics and characterization of thermal contact conductance, mechanical adhesion, and mechanical friction to support improved modeling and validation of numerical simulations. (LANL)
- Conducted mechanical properties experiments on insensitive high explosives in support of the Livermore Insensitive High Explosives Damage model development. (LLNL)
- Conducted mechanical characterization tests of polymers at various temperatures and strain rates in support of constitutive model development. (LLNL)
- Demonstrated adequacy of detonation performance of PBX 9502 main charge using LX-21 boosters at extreme cold Stockpile-to-Target Sequence (STS) requirements. (LLNL)
- Designed and performed tests that generate a variety of crack paths in brittle glass materials that can now be used to understand the factors that influence crack growth. (SNL)
- Developed a shaker input approach to characterize the structural dynamics of systems for use in model calibration and validation. (SNL)
- Developed an experimental diagnostic to allow high-speed, in-situ visualization of the dynamics of active brazing processes for joining metals and ceramics. (SNL)
- Significantly improved the ability to qualify weapons to flight environments by demonstrating a capability for ground testing with combined acceleration, vibration, and spin that have historically been tested separately. (SNL)
- Significantly improved the bandwidth for qualifying ongoing concurrent LEP systems to electromagnetic environments with the commissioning of the new Gigahertz Transverse Electromagnetic test facility. (SNL)

Nuclear Survivability:

- Developed a 10-year plan for *Weapon Hostile Environments Survivability*. (LANL, LLNL, SNL)
- Conducted Cavity System-Generated Electromagnetic Pulse (SGEMP) experiments at the National Ignition Facility (NIF) and at Z Machine to measure responses on more representative cavity geometry for comparison to and validation of models/simulations. (SNL, LLNL)

- Performed a neutron environment survivability analysis for an advanced concept study. (LANL)
- Conducted an Annular Core Research Reactor (ACRR) experiment on uranium test objects with UK. (LANL)
- Supported the B61-12 LEP by providing updates to the Environment Specification and by conducting a thorough study of storage configuration effects on component exposures. (LANL)
- Implemented multiple complimentary algorithm optimizations resulting in massive speed-ups to transport code (~100x) for survivability calculations. (LLNL)
- Conducted x-ray source characterization and high flux, warm x-ray SGEMP experiments at NIF. (LLNL)
- Conducted blind validation test, with uncertainty quantification, of a small heterojunction bipolar transistor (HBT) subject to stochastic neutron effects using tools developed under Qualification Alternative to the Sandia Pulse Reactor (QASPR). (SNL)
- Completed delivery on the final six unique high voltage pulsers which allow qualification testing of hardware to 30 simultaneous conductors for system qualification for both W88 ALT 370 and W87. (SNL)
- Completed W88 ALT 370 circuit predictions using a model for single neutron displacement effects in III-V HBTs. (SNL)
- Provided data from radiation experiments on inhomogeneous material to support x-ray transport code validation. (SNL)

Enhanced Surveillance:

- Matured the Canned Sub Assembly (CSA) Response Model to include spatially aware uranium corrosion predictability with real-time feedback. (LANL)
- Performed a complete series of neutron imaging experiments at Los Alamos Neutron Science Center (LANSCE) on a number of mock CSA components to determine potential source and detection requirements for possible future implementation. (LANL)
- The advanced X-ray scintillator [praseodymium doped gadolinium lutetium oxide (GLO)] was successfully scaled up to a 12x12 inch square and placed in a drop-in mount for testing and deployment in the Confined Large Optical Scintillator Screen and Imaging System (CoLOSSIS) X-ray Computed Tomography system at the Pantex Plant. (LLNL)
- Obtained neutron images of W80 and W87 CSAs at the LANSCE that confirmed numerical predictions published in 2002. (LANL/LLNL)
- Completed B83 System Tester Qualification Engineering Review at room temperature; cold test capability was demonstrated and B83 cold tests were conducted. (SNL)
- Supported modernization programs by completing B61 LEP thermal battery materials aging, detonator material aging, aluminum corrosion-resistant coating, and plastic ball grid under-fill material development work.
- Initiated a new aging study comparing legacy cellular silicone materials against new direct write silicone materials. (KCNSC)
- Completed the PBX 9501 High Explosive Accelerated Aging Study which demonstrated that new formulations of PBX 9501 aged the same, if not better than the war reserve control lot included in the study. (PX)
- Documented the initial run of the Multi-Mass Leak Detector prototype demonstrating all the functional elements. (Y-12)
- Completed facility improvements to establish the Hydrogen Fracture Toughness Tester for performing aging study mechanical tests in a high pressure hydrogen environment. (SR)

Stockpile Responsiveness:

- Defined a Stockpile Responsiveness Program consistent with Congressional direction, and established a joint working group with the DOD.

Engineering
Funding

	(Dollars in Thousands)			
	FY 2016 Enacted	**FY 2017 Annualized CR***	**FY 2018 Request**	**FY 2018 vs FY 2016**
Research, Development, Test and Evaluation				
Engineering				
Enhanced Surety	50,821	37,196	39,717	-11,104
Weapon Systems Engineering Assessment Technology	17,371	17,371	23,029	+5,658
Nuclear Survivability	24,461	40,705	45,230	+20,769
Enhanced Surveillance	38,724	38,724	45,147	+6,423
Stockpile Responsiveness	0	0	40,000	+40,000
Total, Engineering	**131,377**	**133,996**	**193,123**	**+61,746**

* The FY 2017 Annualized CR amounts reflect the P.L. 114-254 continuing resolution level annualized to a full year. These amounts are shown only at the congressional control level and above, below that level, a dash (-) is shown.

Engineering
Explanation of Major Changes
(Dollars in Thousands)

	FY 2018 vs FY 2016
Engineering	
Enhanced Surety: The decrease represents a realignment from technology development investments to address higher NNSA priorities, such as deferred maintenance, the secure transportation asset, and application specific development of the Integrated Surety Architectures (funded elsewhere). The remaining investment will focus on addressing challenges for current insertions and developing surety technologies for future systems.	-11,104
Weapon Systems Engineering Assessment Technology: The increase provides environmental testing, modeling capabilities, and diagnostics for qualifying nuclear weapons in reentry and delivery environment with limited reliance on flight tests.	+5,658
Nuclear Survivability: The increase supports modeling and experimentation of system-generated electromagnetic pulse in cavities and cables; cold and warm x-ray experimental platforms; and outputs modeling (Redbook and Bluebook). The increase also enhances international efforts through the Weapons Effects Strategic Collaboration and supports initial development of the trusted strategic radiation-hardened microelectronics capability and survivability related activities.	+20,769
Enhanced Surveillance: The increase sustains base capability support of ongoing aging studies, predictive modelling efforts and development of targeted non-destructive evaluation testing/diagnostics.	+6,423
Stockpile Responsiveness: The increase reflects initiation of the Stockpile Responsiveness Program to support the creation of design study teams to explore responsiveness concepts as well as development of approaches for accelerating the qualification and production cycle.	+40,000
Total, Engineering	**+61,746**

Engineering
Enhanced Surety

Description

The Enhanced Surety subprogram is dedicated to simultaneously minimizing the probability of unauthorized use and maximizing the reliability of authorized use of a U.S. nuclear weapon while maintaining the highest levels of safety. Enhanced Surety creates, develops, and matures advanced safety, security, and use-control or denial technologies, to minimize the probability of an accidental nuclear explosion and, in the unlikely event that security fails and unauthorized access is gained, reduce the risk of an unauthorized nuclear yield to the lowest possible level.

Enhanced Surety seeks advances in leading-edge technologies in two timeframes:

- Maturing near-term surety concepts and technologies to offer the most effective surety solutions for the enduring stockpile and future insertion opportunities achievable within the time-lines of known LEPs or other improvements in weapon functionality; and
- Continuously creating and evolving highly advanced surety technologies, independent of specific weapon types or insertion opportunities that can result in major surety improvements.

Enhanced Surety incorporates national security guidance as outlined in the Presidential Policy Directive (PPD) – 35; DOE Order 452.1D, Nuclear Explosive and Weapon Surety Program; the NNSA Defense Programs surety strategy; and the 2010 JASON Surety Study findings and recommendations; in conjunction with the Joint Integrated Lifecycle Surety (JILS) risk assessment capability to identify the most cost-effective surety technologies. This enables program and weapon system managers to make better-informed implementation decisions on stockpile surety improvement options.

Enhanced Surety activities include:

(1) Advanced Safety – Minimizes the probability of accidental nuclear yield or dispersion of fissile material. Develops improved control over warhead initiation including improved stronglinks, weaklinks, firing systems, and high explosive initiation systems, in order to provide nuclear weapon safety.

(2) Advanced Use Control/Denial – Creates and matures options, internal and/or external to the warhead, to minimize the potential for deliberate unauthorized use of a U.S. nuclear weapon.

(3) Integrated Surety Solutions (ISS) – Develops and demonstrates both system concepts and associated enabling technologies that could integrate weapon capabilities with physical security.

Enhanced Surety

Activities and Explanation of Changes

FY 2016 Enacted	FY 2018 Request	Explanation of Changes FY 2018 vs FY 2016
Enhanced Surety $50,821,000	**Enhanced Surety $39,717,000**	**Enhanced Surety -$11,104,000**
• Perform material compatibility and parametric studies on MPS options. • Mature, test, and evaluate the next generation highest priority device. • Test and evaluate technology for multi-venue ISS implementation for Air Force systems.	• Perform testing of coupons, full-scale compatibility, and gas spectroscopy to investigate effects of introducing new materials to the system. • Minimum support of integration development for the Highest Priority Next Gen components. • Develop a refined multi-venue system prototype that can be quickly fielded and tested in a representative environment.	• This 11,104,000 decrease represents a realignment from technology development investments to address higher NNSA priorities. The remaining investment will focus on addressing challenges for current insertions and developing surety technologies for future systems.

Engineering
Weapon Systems Engineering Assessment Technology

Description

Weapon Systems Engineering Assessment Technology (WSEAT) provides experimental capabilities, diagnostics, and data needed for assessing that weapons will not be damaged by delivery environments and that weapons will also be robust to possible accidents. It is motivated by the evolving needs of stockpile stewardship for cutting-edge testing and data to increase efficiency and model predictive capability, as well as for qualification of weapons hardware and quantification of weapons margins and assessment uncertainties. WSEAT includes all relevant stockpile-to-target sequence (STS) and manufacturing support service environments excluding nuclear and hostile electromagnetic environments.

WSEAT supports activities from foundational discovery through highly complex experimentation and analysis, with the goal of maturing technology, methodology, and analysis tools to the point where they can be deployed for direct impact to Directed Stockpile Work or as validation data for Advanced Simulation and Computing (ASC) models.

Weapon Systems Engineering Assessment Technology activities include:

(1) Methodology Needs and Engineering Research – Supports engineering research and the development of advanced diagnostics to acquire physics-based engineering data. In addition, this element supports the development of a methodology that integrates experimental capability development with modeling and simulation within an engineering-focused Quantification of Margins and Uncertainties (QMU) framework to support the stockpile sustainment program qualification activities.

(2) Experimental Validation – Develops experimental techniques and provides high fidelity, appropriately scaled, substantial experimental data to validate models for predicting weapon performance and safety with quantified margins and uncertainties. Further, it develops test methodologies and deploys diagnostics in ground-based simulations of flight environments that facilitates the quantification of weapon responses to realistic environments in support of weapon qualification testing and surveillance.

Weapon Systems Engineering Assessment Technology

Activities and Explanation of Changes

FY 2016 Enacted	FY 2018 Request	Explanation of Changes FY 2018 vs FY 2016
Weapon Systems Engineering Assessment Technology $17,371,000	**Weapon Systems Engineering Assessment Technology $23,029,000**	**Weapon Systems Engineering Assessment Technology +$5,658,000**
• Validate test capability and instrumentation to quantify weather effects on Reentry Body/Reentry Vehicle (RB/RV) flight bodies using ground test facilities. • Develop a RB/RV system-scale multi-axis hybrid shaker test capability for shock and vibration testing of RB/RV and for contact fuse performance qualification margins. • Characterize Lightning Arrestor Cable (LAC) response to lightning for LAC qualification and predictive performance. • Validate capability for stress state characterization of high explosive systems for all STS environments. • Incorporate insensitive high explosive failure into material models. • Develop polymer material models that incorporate failure mechanisms. • Quantify uncertainties and assess margins for a reentry system primary in normal and abnormal environments. • Characterize electromagnetic test facilities (EMSE, MSC and GTEM). • Characterize dynamic brazing processes.	• Combine thermal, fluid, electromagnetic, and structural dynamic environments for qualification across all mission STS. • Develop predictive integrated delivery environments in ground base capabilities with comparable analytic capabilities for design and qualification. • Develop predictive performance models in delivery environments for all nuclear weapon material. • Develop predictive performance models in delivery environments for components selected via a risk informed approach (e.g., thermal batteries, glass-to-metal seals, and mechanisms). • Validate capability for stress state characterization of high explosive systems for all STS environments. • Incorporate insensitive high explosive failure into material models. • Develop polymer material models that incorporate failure mechanisms. • Quantify uncertainties and assess margins for a reentry system primary in normal and abnormal environments. • Characterization of electromagnetic test facilities (EMSE, MSC and GTEM). • Characterization of dynamic brazing processes.	• Increase restores support for diagnostic development of multi-environment assessment and characterization technologies and increase support of QMU assessment through experimentation. • Increase addresses environmental testing, engineering tools, and technical capabilities for qualifying nuclear weapons in reentry and delivery environments.

Engineering
Nuclear Survivability

Description

Nuclear Survivability provides the tools and technologies necessary for ensuring that United States weapons will penetrate enemy defenses. Since weapons entering the stockpile are expected to be fielded for decades, Nuclear Survivability includes projections for the evolution of defensive technologies.

The modern analysis capabilities developed by Nuclear Survivability will permit (1) more quick and accurate assessment of the potential impacts to warhead nuclear survivability from refurbishments; (2) surveillance discoveries; (3) natural aging; and (4) the introduction of new materials, technologies, and/or component designs. The survivability of our nuclear weapons in a hostile environment, including a possible fratricide situation, is an area of study gaining importance as technologies evolve. In order to understand survivability in a hostile environment, research must be undertaken to examine the weapon outputs (Red and Blue), the propagation (a.k.a. effects), and the effects coupling into the weapon intended to survive.

Nuclear Survivability scope includes: (1) developing scientific and engineering models for understanding radiation effects; (2) improving laboratory radiation sources and diagnostics to support code validation and hardware qualification experiments; (3) generating experimental data to validate scientific and engineering models; (4) understanding radiation-hardened design strategies; and (5) evaluating candidate and evolving stockpile technologies for radiation hardness capabilities in a generalized, weapon-relevant configuration.

Nuclear Survivability activities include:

(1) Vulnerability and Hardening of Nuclear Components – Provide nuclear warhead output and hostile environment characteristics in support of the enduring and evolving stockpile and assure the effectiveness of the methods and tools used to determine survivability. Work encompasses development and validation of experimental tools to enhance computational simulation models and codes to assess and ensure their quality, and development of interfaces with ASC and other codes needed for research, development, test and evaluation.

(2) Nuclear Survivability of Nuclear Components – Develop and validate modeling and experimental nuclear survivability assessment tools for nuclear components. Work encompasses the development of a predictive modeling capability for analyzing nuclear weapons systems in radiation environments.

(3) Radiation Effects Science for Qualification to X-Ray Effects without the Use of High Fidelity Testing Capabilities – Assure that critical STS requirements for x-ray effects can be met in the wake of the moratorium on underground testing. This requires development and validation of combined modeling and experimentation capabilities to qualify nuclear and non-nuclear components.

(4) Radiation Effects Science Advancement for Stockpile Qualification without the Use of Highly Enriched Uranium – Create new approaches, technologies and infrastructure for qualification of microelectronics, microsystems, and other non-nuclear components to combined fast neutron and gamma effects without the use of test sources requiring highly enriched uranium.

(5) Design and Qualification Tools Transformation and Technologies for System Survivability – Assure critical STS requirements are met with adequate confidence and cost-effectiveness. Activities focus on the development of new approaches, technologies and infrastructures for qualification of microelectronics, micro-systems, and other non-nuclear components.

Nuclear Survivability

Activities and Explanation of Changes

FY 2016 Enacted	FY 2018 Request	Explanation of Changes FY 2018 vs FY 2016
Nuclear Survivability $24,461,000	**Nuclear Survivability $45,230,000**	**Nuclear Survivability +$20,769,000**
• Deliver final validation data for the W88 ALT370 qualification-level device and circuit models for compound semiconductor HBTs and circuits with Uncertainty Quantification. • Model and validate silicon transistor devices. • Incorporate InRad environments into the B61-12 environmental specification. • Investigate non-nuclear survivability topics for future sustainment program incorporation. • Plan for the ACRR test with special nuclear material to support the W80-4 and/or the W78-1. • In cooperation with the Defense Threat Reduction Agency, deliver operational capability in Source Region Electromagnetic Pulse (SREMP)/SGEMP to U.S. Strategic Command in Cooperation with the Defense Threat Reduction Agency (DTRA) through the Weapons Effects Strategic Collaboration. • Develop experimentally validated models for thermal, blast, and dust. • Acquire SGEMP experimental data for model validation. • Develop experimentally validated impulse and blowoff models. • Continue eRedbook updates with added suite of threat models relevant to future sustainment program studies. Include all stockpile weapon outputs in the eBluebook. (These ebooks look at outputs and effects of different devices to support the modeling of hostile environments).	• Provide capabilities to determine margin-to-failure for key components in hostile environments. • In cooperation with DTRA, deliver operational capability in SREMP/SGEMP to U.S. Strategic Command in Cooperation through the Weapons Effects Strategic Collaboration. • Develop experimentally validated models for thermal and blast phenomena. • Acquire SGEMP experimental data for model validation. • Develop experimentally validated impulse and blowoff models. • Continue eRedbook updates with added suite of threat models relevant to future sustainment program studies. Include all stockpile weapon outputs in the eBluebook. • Incorporate ultraviolet/infrared spectrum into codes. • Reach CD-1 for a capability to provide trusted microelectronics for the future stockpile.	• The near doubling of this subprogram provides capabilities described in the Weapon Hostile Environment Survivability Plan needed to assure that US warheads will survive encounters with evolving defensive technologies. These capabilities include improvements in modeling weapon outputs, studies of advanced technology solutions for improving survivability, and platforms for reproducing the x-ray, thermal and hydrodynamic environments produced by adversary nuclear defenses. • The funding increase will also support design and evaluation of a Trusted Microsystems Capability. This capability is needed to replace the aging Microsystems and Engineering Sciences Applications (MESA) Silicon Fabrication Facility (SiFab) which reached end of life in 2013 but is being refurbished to operate until 2025.

FY 2016 Enacted	FY 2018 Request	Explanation of Changes FY 2018 vs FY 2016
• Incorporate ultraviolet/infrared spectrum into codes.		

Engineering
Enhanced Surveillance

Description

Enhanced Surveillance (ES) provides diagnostics and the aging science needed to ensure that aging will not harm the nuclear weapons stockpile. ES contributes to weapon safety, performance, and reliability by providing the tools needed to predict material, component, and subsystem lifetimes, and detect the precursors of potential age-induced defects. These efforts are dedicated to understanding aging phenomena and how they affect weapon lifetime assessments.

The ES program provides insight on the chemical compatibility of reused legacy materials and components with new materials introduced to weapons undergoing LEPs. In addition to lifetime predictions, new diagnostic tools are being developed and deployed to support conventional surveillance efforts and to provide additional data needed to validate predictive aging models. ES enables a more robust stockpile surveillance program with the overarching goal of identifying problems as early as possible in order to minimize their impact on the effectiveness of the deterrent.

Enhanced Surveillance activities include:

The ES program contributes to weapon safety, performance, and reliability by providing the tools needed to predict material, component, and subsystem lifetimes, and detect the precursors of potential age-induced defects. ES efforts are dedicated to understanding aging phenomena and how they affect weapon lifetime assessments. Six functional areas are supported by Major Technical Elements:

(1) **Pits** – Develop and deliver new analytical methods, tools, modeling, and diagnostics, including non-destructive evaluation techniques, to achieve timely, less invasive, and more cost-effective Core Surveillance.

(2) **Canned Sub Assembly and Cases** – Determine when or if components using experimentally validated lifetime assessment models need to be replaced in the enduring stockpile.

(3) **High Explosives** – Determine when main charges and boosters need to be replaced based on new predictive methods and non-destructive evaluation tools while examining early detection of potential changes in behavior related to safety, performance, and reliability.

(4) **Non-Nuclear Components** – Deliver component-level lifetime assessments to the programs responsible for sustainment and system refurbishment decisions. Capabilities developed will enhance the technical basis relative to the safety, use control, and reliability of components in the stockpile.

(5) **Non-Nuclear Material** – Understand critical materials (e.g., organic, metallic, and glass/ceramic) properties and predict changes for both existing and replacement materials in the enduring weapons systems. Develop mature materials aging performance models along with advanced diagnostics and analytical techniques and apply the full complement of non-nuclear material capabilities to assist in strategies for identifying next-generation materials.

(6) **Systems** – Provide improved confidence in future weapons reliability, safety, and performance. This goal will be accomplished by augmenting the existing surveillance program with system-level evaluation diagnostics that include new capabilities to measure component-level parameters during system testing.

Enhanced Surveillance

Activities and Explanation of Changes

FY 2016 Enacted	FY 2018 Request	Explanation of Changes FY 2018 vs FY 2016
Enhanced Surveillance $38,724,000	**Enhanced Surveillance $45,147,000**	**Enhanced Surveillance +$6,423,000**
• Complete an Enhanced Surveillance stockpile aging and lifetime assessment report to support the annual assessment process. • Demonstrate a broad science-based Component and Material Evaluation (CME) program for predictive assessment and uncertainty quantification for selected components. • Develop, validate, and deploy improved predictive capabilities and diagnostics to assess performance and lifetime for nuclear and non-nuclear materials. • Characterize the aging behavior of legacy and potential replacement materials and components in coordination with decision making on sustainment programs, ALTs, and Significant Finding Investigations. • Conduct CME activities on a prescribed set of component families. • Refine lifetime assessments across the nuclear explosive package materials and components for sustainment program use. • Document advances in predictive aging models for second-tier polymeric materials in LLNL systems.	• Complete an Enhanced Surveillance stockpile aging and lifetime assessment report to support the annual assessment process. • Develop and refine understanding of stockpile aging and age aware models for weapon materials, components, and subsystems. Provide assessments of aging model status for highest-risk materials identified under laboratory stewardship. • Provide timely warning of aging phenomenon that threaten the effectiveness of the nuclear deterrent. • Develop new diagnostics to fill surveillance and data needs for improved aging models. • Develop and plan capabilities needed to enable certification of new materials for incorporation into LEPs, MODs, and ALTs. • Obtain hardware and begin evaluations and model development from the B83. • Publish lifetime estimates for all current weapon systems. • Procure x-ray computed tomography system.	• The increase sustains base capability support of ongoing aging studies, predictive modelling efforts and development of targeted non-destructive evaluation testing/diagnostics.

Engineering
Stockpile Responsiveness

Description

A new provision in the FY 2016 Authorization Act, Section 3112 of the FY 2016 NDAA established the need for NNSA to develop a Stockpile Responsiveness Program. NNSA will execute this program in consultation with DOD. The Stockpile Responsiveness Program will focus on developing scenarios to respond to representative future threats, challenges, and opportunities and to explore concepts jointly with the DOD including prototyping, flight testing, non-nuclear component qualification, and methods for Nuclear Explosive Package (NEP) certification. This program will exercise the capabilities required to support all phases of the joint nuclear weapons life cycle process, transfer knowledge and skills to the newer generation of nuclear weapon designers and engineers, and strengthen integration between DOD and NNSA. The budget was specified in the FY 2017 NDAA and it has not previously been appropriated.

Stockpile Responsiveness activities include:

The Stockpile Responsiveness Program will develop and demonstrate capabilities to shorten design, certification, and manufacturing cycles to minimize time and costs leading to engineering prototype and production. These efforts will include both non-material (procedures) and material improvements (manufacturing, improved design, new testing capabilities). The Stockpile Responsiveness Program will also execute the weapon “pathfinder” process that will enhance and exercise the spectrum of capabilities required to develop and manufacture nuclear weapons to ensure the nuclear deterrent of the United States remains safe, secure, reliable, credible, and responsive. Stockpile Responsiveness will be conducted in coordination with DOD.

Stockpile Responsiveness

Activities and Explanation of Changes

FY 2016 Enacted	FY 2018 Request	Explanation of Changes FY 2018 vs FY 2016
Stockpile Responsiveness $0	**Stockpile Responsiveness $40,000,000**	**Stockpile Responsiveness +$40,000,000**
• The Stockpile Responsiveness Program was unfunded in FY 2016 and FY 2017.	• Establish a formal charter for a joint DOE/DOD working group that will oversee Stockpile Responsiveness. • Identify requirements associated with a “challenge” scenario and, in coordination with DOD begin an integrated exercise that includes design, qualification, engineering, hydrodynamic tests, flight testing, and prototyping. • Develop and test small-scale hardware to validate concepts. • Provide engineering to enable agile qualification with hydrodynamic tests and sounding rocket tests.	• Stockpile responsiveness is new in FY2018.

Engineering
Performance Measures

In accordance with the GPRA Modernization Act of 2010, the Department sets targets for, and tracks progress toward, achieving performance goals for each program.

	FY 2016	FY 2017	FY 2018
Performance Goal (Measure)	**Technology Maturation Capabilities -** The annual progress towards the maturation of technologies and stockpile assessment capabilities as measured by the number of deliverables in the implementation plans completed.		
Target	17 deliverables	13 deliverables	14 deliverables
Result	Met - 17	TBD	TBD
Endpoint Target	Until the last nuclear weapon system in the stockpile is dismantled, NNSA will continue to mature technologies and stockpile assessment capabilities to support Directed Stockpile Work on nuclear weapons refurbishment and assessment activities.		

Engineering
Capital Summary

(Dollars in Thousands)

	Total	Prior Years	FY 2016 Enacted	FY 2016 Current	FY 2017 Annualized CR*	FY 2018 Request	FY 2018 vs FY 2016
Capital Operating Expenses Summary (including Major Items of Equipment (MIE))							
Capital Equipment >$500K (including MIE)	N/A	N/A	3,668	3,668	3,749	3,831	+163
Plant Projects (GPP and IGPP)	N/A	N/A	0	0	0	0	0
Total, Capital Operating Expenses	**N/A**	**N/A**	**3,668**	**3,668**	**3,749**	**3,831**	**+163**
Capital Equipment > $500K (including MIE)							
Total Non-MIE Capital Equipment	N/A	N/A	3,668	3,668	3,749	3,831	+163
Total, Capital Equipment (including MIE)	**N/A**	**N/A**	**3,668**	**3,668**	**3,749**	**3,831**	**+163**
Plant Projects (GPP and IGPP)							
Total Plant Projects (GPP/IGPP) (Total Estimated Cost (TEC) <$5M)	N/A	N/A	0	0	0	0	0
Total, Plant Projects (GPP/IGPP)	**N/A**	**N/A**	**0**	**0**	**0**	**0**	**0**
Total, Capital Summary	**N/A**	**N/A**	**3,668**	**3,668**	**3,749**	**3,831**	**+163**

* The FY 2017 Annualized CR amounts reflect the P.L. 114-254 continuing resolution level annualized to a full year. These amounts are shown only at the congressional control level and above, below that level, a dash (-) is shown.

Inertial Confinement Fusion Ignition and High Yield

Overview

The Inertial Confinement Fusion Ignition and High Yield (ICF) program supports the U.S. Department of Energy's (DOE) national security mission to maintain a safe, secure, and effective nuclear deterrent by operating and utilizing leading-edge experimental facilities for high-energy-density (HED) physics. The advanced experimental and modeling capabilities funded by ICF support weapon-relevant applications and have demonstrated additional benefit to fundamental science and other civilian applications. HED environments involve extreme pressures, temperatures, and density gradients; aside from nuclear events, where the majority of the energy (i.e., the yield) is generated in the HED state, such environments can only be reproduced in specialized laboratories. Thus, the ICF program, with its advanced experimental and modeling tools, as well as its multifaceted HED expertise, serves as a core component of the Stockpile Stewardship Program (SSP).

The majority of the program's experiments are conducted at the NNSA's three major HED facilities: the National Ignition Facility (NIF) at the Lawrence Livermore National Laboratory (LLNL), the Z Facility at the Sandia National Laboratories (SNL), and the Omega Laser Facility at the Laboratory for Laser Energetics (LLE) at the University of Rochester. The Naval Research Laboratory (NRL), the Los Alamos National Laboratory (LANL), General Atomics (GA), and Schafer Corp. also contribute to the Program's HED endeavors, while multiple academic partners are supported by ICF, under the Joint Program in High Energy-Density Laboratory Plasmas (jointly sponsored by the DOE Office of Fusion Energy Sciences).

ICF/HED experimental platforms are used to study dynamic material properties, complex hydrodynamic processes, nuclear and plasma physics, thermonuclear burn and ignition, radiation transport and neutronics, opacities and radiation mean free paths, with scientific applications that include nuclear astrophysics, weapons performance, weapon effects, forensics, and nuclear survivability. Moreover, the ICF program coordinates closely with several other NNSA program elements within the Office of Research, Development, Test, and Evaluation; priorities and requirements for these programs are documented in the Stockpile Stewardship and Management Plan (SSMP).

"Non-ignition" HED activities include:

- Investigating material behaviors in HED regimes presently inaccessible via other experimental techniques;
- Improving the predictive capability of our science and engineering models in high-pressure, high-energy, high-density regimes; and
- Maintaining the scientific leadership and credibility necessary to recruit, train, and retain scientists and engineers to participate in stockpile stewardship.

"Ignition" related ICF activities include:

- Creating and diagnosing perturbations prevalent in plasmas and thermonuclear environments;
- Developing high-fidelity diagnostics, advanced experimental platforms, and predictive capabilities and simulations; and
- Making progress towards the achievement and application of multi-mega Joule fusion yields.

Highlights of the FY 2018 Budget Request

The FY 2018 ICF Program builds upon the accomplishments listed below in several areas that will continue to support the DOE mission to maintain a safe, secure, and effective nuclear deterrent. These include:

- Providing key data that reduces uncertainty in calculations of nuclear weapons performance;
- Obtaining data on the properties of high atomic weight materials, such as uranium and plutonium, under HED conditions that have previously not been achieved in laboratory environments using the Z Facility at SNL and the NIF at LLNL;
- Fielding platforms at Omega and NIF to measure the complex hydrodynamic behavior of materials;
- Understanding physics issues currently limiting ICF target performance at the NIF;
- Continuing progress in the development of laser-driven direct-drive on Omega and the NIF;
- Building on successes demonstrated in the magnetically-driven direct-drive approach by performing magnetized liner inertial fusion (MagLIF) experiments;

- Ongoing implementation of the National Diagnostic Plan to develop new transformative diagnostics and to optimize the cost-effective development of diagnostics for NNSA's HED facilities;
- Continued safe operation of NNSA's major HED facilities in accordance with their Governance Plans;
- Continuing improvements in operational efficiency at the NIF.

The FY 2018 Request supports operations at NNSA's three major HED facilities: the NIF, the Z facility, and Omega. An emphasis on improving operational efficiencies at all these facilities will be continued with constant program planning to ensure priorities are aligned with SSP requirements.

The FY 2018 budget provides approximately $110,546,000 for the operation and utilization of the Z facility at SNL. This includes $57,478,000 within the ICF Program and approximately $53,068,000 under the Science Program. The ICF budget provides $326,159,000 for the operations of the NIF for all users and the ICF Program at LLNL, and $66,852,000 for the operations of the Omega Laser Facility for all users as well as the ICF program at the University of Rochester:

	(Dollars in Thousands)		
	NIF	**OMEGA**	**Z Facility**
Facility/Subprogram			
Diagnostics, Cryogenics, and Experimental Support	49,952	6,700	7,500
Facility Operations and Target Production	224,276	31,652	41,978
Ignition	35,631	26,500	0
Pulsed Power ICF	0	0	7,500
Support of Other Stockpile Programs	16,300	2,000	500
Total Operation and Utilization	**326,159**	**66,852**	**57,478**

At each HED facility the demand for facility use for ignition and non-ignition activities typically exceeds the actual utilization time available by a factor of two. To meet this demand at the NIF, a plan was executed in FY 2016 to increase the annual rate of shots to 400 per year, which doubles the shot rate from FY 2014. LLNL achieved this goal by implementing an action plan to address the findings and recommendations from a 2014 study on improving NIF efficiency. By September 2016, all of the 80 recommendations had been implemented. In FY2018, approximately 8% of NIF use time will be reserved for partnering with academic institutions to carry out science of mutual benefit to the NNSA.

FY 2016 Accomplishments

- Exceeded the goal of 400 data-acquiring shots (417 experiments were executed at the NIF in FY 2016), an increase of more than double the number of shots executed in FY 2014.
- Measured, for the first time, the strength of plutonium at high pressures and its effect on the growth of instabilities. LLNL obtained critical data on the atomic structure of plutonium at high pressures on the NIF.
- Developed platforms on the NIF that enabled studies of the plutonium equation of state, complex hydrodynamics, boost, and radiation effects for the SSP. Many of these platforms were originally developed at Sandia's Z facility before being shared.
- Identified two significant obstacles impeding high-yield (ignition) on the NIF: (1) time-dependent symmetry of the implosion, and (2) perturbations arising from capsule support mechanisms. Approaches to mitigating both obstacles have been developed and are being explored in FY 2017.
- Executed the 19th plutonium experiment at SNL's Z facility in collaboration with LANL in August 2016. This experiment supported the B61-12 Life Extension Program (LEP) certification.
- Designed and produced new record x-ray yields and fluences at SNL using new z-pinch sources. These "warm x-ray" sources extend the energy range of useful radiation effects environments on Z Facility.
- LANL designed and built the first component of the new gamma ray detector that was installed on the NIF. This will be one of the first transformational diagnostics of the National Diagnostic Plan to be implemented.

- LANL fielded its first liquid layer capsule at the NIF. This design forms the hot spot in a novel way to study capsule convergence and hot-spot formation issues.
- Performed 2173 experiments last year on the Omega laser. Omega continues to be a workhorse and testbed supporting academic users, diagnostic development, and platform development for the ICF community.

Inertial Confinement Fusion Ignition and High Yield
Funding

	(Dollars in Thousands)			
	FY 2016 Enacted	FY 2017 Annualized CR*	FY 2018 Request	FY 2018 vs FY 2016
Research, Development, Test and Evaluation				
Inertial Confinement Fusion Ignition and High Yield				
Ignition	76,334	76,334	79,575	+3,241
Support of Other Stockpile Programs	22,843	22,843	23,565	+722
Diagnostics, Cryogenics and Experimental Support	58,587	63,722	77,915	+19,328
Pulsed Power Inertial Confinement Fusion	4,963	4,963	7,596	+2,633
Joint Program in High Energy Density Laboratory Plasmas	8,900	8,900	9,492	+592
Facility Operations and Target Production	339,423	339,423	334,791	-4,632
Total, Inertial Confinement Fusion Ignition and High Yield	**511,050**	**516,185**	**532,934**	**+21,884**

* The FY 2017 Annualized CR amounts reflect the P.L. 114-254 continuing resolution level annualized to a full year. These amounts are shown only at the congressional control level and above, below that level, a dash (-) is shown.

Inertial Confinement Fusion Ignition and High Yield
Explanation of Major Changes
(Dollars in Thousands)

	FY 2018 vs FY 2016
Inertial Confinement Fusion Ignition and High Yield	
Ignition: Increase supports continued research in alternate ablators, hohlraum energetics and design, capsule support engineering, and analysis of data acquired from one-dimensional implosions on the NIF.	+3,241
Support of Other Stockpile Programs: Increase supports the progressive execution of the Ten-Year HED Strategic Plan with primary focus on establishing new platforms and maintaining existing platforms for various HED and ICF activities in accordance with the SSP. Other activities include the studies of materials in HED environments (i.e., extreme pressures and temperatures) as well as data analyses of shear-induced instabilities under HED conditions.	+722
Diagnostics, Cryogenics, and Experimental Support: The increase supports the National Diagnostics Plan in design, engineering, and implementation of transformation diagnostics – which tests the first x-ray gated single line-of-site measurement on Omega, deploys Optical Thomson-scattering diagnostics at NIF and Omega, and develops Gallium-Arsenide diodes for x-ray detection on hybrid complementary metal-oxide semiconductor (hCMOS) cameras.	+19,328
Pulsed Power Inertial Confinement Fusion: Increase supports the enhanced exploration of magnetically-driven implosions. It supports MagLIF ICF target experiments for model validation and verification as well as laser energy and magnetic field sensitivity and parametric investigations.	+2,633
Joint Program in High Energy Density Laboratory Plasmas: Increase reflects continued support of the Joint Program in HEDLP, which is a joint effort with the DOE's Office of Science to support basic HED research that strengthens the science, technology, and engineering base. This work will also enable the program to collaborate with academic institutes on HED and ICF endeavors.	+592
Facility Operations and Target Production: Planned decrease reflects the shift of funds from the ICF Program to higher priority work scope within Research, Development, Test, and Evaluation (RDT&E) activities.	-4,632
Total, Inertial Confinement Fusion Ignition and High Yield	**+21,884**

Inertial Confinement Fusion Ignition and High Yield
Ignition

Description

This subprogram explores a number of strategies that may achieve thermonuclear burn onset, ignition, and ultimately multi-mega Joule fusion yield at laboratory scale to form, if achieved, a set of unique capabilities for the enduring SSP, as well as to the qualification of nuclear components and the assessment and certification of nuclear weapon modernization. This subprogram supports achieving those goals through experimental design and execution; computation (i.e., modeling, simulations, and predictive capabilities); applied research and development (R&D); engineering and analyses; and diagnostics implementations. The program's near-tem goal is to advance current understanding of ICF Implosions through the pursuit of the following six Priority Research Directions (PRDs):

- Driver-Target Coupling
- Target Preconditioning
- Implosions
- Stagnation and Burn
- Intrinsic and Transport Properties
- Modeling Approximations and Validation

The long-term goals of this subprogram include achieving substantial yield needed to meet nuclear survivability requirements and using burning plasma outputs to reach previously inaccessible weapon-relevant regimes with improved fidelity. The core requirements for this Program are described in the SSMP, the Ten Year HED Strategic Plan, the National Diagnostics Plan, the Integrated Experimental Campaigns, and the ICF Program Framework.

Activities in Science, Advanced Simulation and Computing (ASC), Directed Stockpile Work (DSW), and other stockpile programs are coupled to approaches taken by this subprogram's attempts to reach ignition in order to successfully execute their respective SSMP responsibilities.

Ignition

Activities and Explanation of Changes

FY 2016 Enacted	FY 2018 Request	Explanation of Changes FY 2018 vs FY 2016
Ignition $76,334,000	**Ignition $79,575,000**	**Ignition +$3,241,000**
• Conduct experiments to test modeling of hohlraum energy transport and dynamics. • Develop techniques to measure time dependent symmetry and its effect on performance in indirect-drive targets. • Continue integrated cryogenic DT implosions on Omega to establish the predictive basis for NIF equivalent hydro performance. • Develop an implementation plan for crossed beam energy transfer mitigation. • Develop a working concept to field a layered target for polar direct drive experiments.	• Driver-target Coupling ▪ Improve understanding of laser propagation, laser-plasma interactions, and cross-beam energy transfer in order to improve the efficiency of laser coupling to the hohlraum or capsule. • Target Preconditioning ▪ Improve models for shock propagation and timing within capsules to optimize the laser pulse shape. • Implosions ▪ Study hydrodynamic instability and mix in a capsule and the effects of initial conditions including engineered features such as the fill tube and support structures. • Stagnation and Burn ▪ Diagnose and model the fuel shape, density, and energy distribution in order to better understand hot spot formation. • Intrinsic and Transport Properties ▪ Conduct focused experiments to provide accurate equations-of-state for materials of interest over the range of relevant temperatures and pressures. • Modeling Approximations and Validation ▪ Integrate these efforts throughout the other five PRDs.	• The increase supports continued research in alternate ablators, hohlraum energetics and design, capsule support engineering, and analysis of data acquired from one-dimensional implosions on the NIF.

Inertial Confinement Fusion Ignition and High Yield
Support of Other Stockpile Programs

Description

In the HED state, material temperatures, pressures, and densities exceed that of condensed-matter and enter a regime predominantly described by plasma physics. This complex and dynamic state is critical to weapon-relevant implosions and its study is a core component of the Stockpile Stewardship Program. Specifically, the areas supported in this subprogram include dynamic material properties, fluid and plasma hydrodynamics, low-energy nuclear physics, hydrodynamic instability-induced mix, burn, boost, radiation transport and opacities, and yield applications relevant to outputs, environments, and effects. This subprogram coordinates closely with the Science program to develop and integrate the experimental infrastructure and capabilities required to execute experiments at HED facilities. The core requirements for this subprogram are described in the SSMP, the Ten-Year HED Strategic Plan, and the National Diagnostics Plan.

Science, Advanced Simulation and Computing (ASC), Directed Stockpile Work (DSW), and other stockpile programs are informed by, and in some cases benefit from, the capabilities developed by this subprogram to successfully execute respective SSMP responsibilities.

Support of Other Stockpile Programs

Activities and Explanation of Changes

FY 2016 Enacted	FY 2018 Request	Explanation of Changes FY 2018 vs FY 2016
Support of Other Stockpile Programs $22,843,000	**Support of Other Stockpile Programs $23,565,000**	**Support of Other Stockpile Programs +$722,000**
• Implement the Ten-Year HED Strategic Plan to support the requirements of the SSMP, including demonstrating an HED-coupled hydro-burn platform. • Provide data in support of PCF peg posts, particularly regarding primary boost. • Provide support for experiments and non-ignition HED data using NIF, Omega, Z, and other facilities to support NNSA's SSP needs. • Mature strength and diffraction platforms for dynamic plutonium experiments on the NIF. • Measure the effect of shell mixing on deuterium tritium burn. • Validate models relevant to thermonuclear burn. • Provide platform and diagnostic capabilities for validating the impact of surety technologies in the future stockpile.	• Continue to implement the Ten Year HED Strategic Plan to support the requirements of the SSMP, including demonstrating an HED-coupled hydro-burn platform. • Develop platforms for experiments supporting the validation of radiation and plasma opacity models. • Assess requirements for a high yield platform to support LEP and long-term stockpile modernization. • Obtain deuterium-tritium burn and other data required to support the FY 2019 Predictive Capability Framework (PCF) pegpost. • Perform pioneering experiment for weapons physics using a double shell platform. • Develop platforms to provide Radiation Effects Science capabilities to support the FY 2020 PCF pegpost.	• The increase supports the progressive execution of the Ten-Year HED Strategic Plan with primary focus on establishing new platforms and maintaining existing platforms for various HED and ICF activities in accordance with the SSP. Other activities include the studies of materials in HED environments (i.e., extreme pressures and temperatures) as well as data analyses of shear-induced instabilities under HED conditions.

Inertial Confinement Fusion Ignition and High Yield
Diagnostics, Cryogenics, and Experimental Support

Description

Advanced experimental capabilities that reproduce the HED and thermonuclear conditions require parallel investments in diagnostic and experimental capabilities. This subprogram oversees R&D and engineering for laser and pulsed-power experimental design, execution, and diagnostics; it is also responsible for associated technologies for data acquisition, measurement, and analyses. This subprogram's responsibilities further encompass the development and deployment of supporting equipment and technologies to facilitate experimental requirements for relevant applications to materials studies under HED conditions, national security, and discovery science. The central requirements for this subprogram are presented in the SSMP, the Ten Year HED Strategic Plan, the National Diagnostics Plan, and the ICF Program Framework.

Science, ASC, DSW, and other stockpile programs are informed by, and in some cases benefit from, the capabilities developed by this subprogram to successfully execute respective SSMP responsibilities.

Diagnostics, Cryogenics, and Experimental Support

Activities and Explanation of Changes

FY 2016 Enacted	FY 2018 Request	Explanation of Changes FY 2018 vs FY 2016
Diagnostics, Cryogenics and Experimental Support $58,587,000	**Diagnostics, Cryogenics and Experimental Support $77,915,000**	**Diagnostics, Cryogenics and Experimental Support +$19,328,000**
• Continue efforts from FY 2015 to develop and support diagnostic capabilities, cryogenic systems, and user optics at NIF, at a pace commensurate with facility operations. • Continue development and testing of advanced diagnostics on NIF, Omega, and Z, including extending x-ray spectrometer capability to 10-20 kiloelectronVolts (keV) on NIF, developing timeresolved x-ray diffraction diagnostics and higher photon energy x-ray imaging for NIF, Omega, and Z, design of a fifth harmonic probe beam for OMEGA, develop higher time-resolution gamma spectrometer and a time-dependent neutron spectrometer for NIF, ongoing improvements to the beamlet laser on Z. • Continue implementation of the National ICF/HED Diagnostics Plan.	• Develop and support diagnostic capabilities, cryogenic systems, user optics, laser, and pulsed-power capabilities at the NIF, Omega, and Z facilities, as well as other supporting facilities at a pace commensurate with program requirements. • Implement and update the National Diagnostics Plan. ▪ Continue to develop, advance, and implement diagnostics and associated analysis packages that can operate in challenging HED environments on the NIF, Omega, and Z, including: o X-ray gating along a single line-of-sight for all missions and all three facilities at time resolutions from 20-2000 picoseconds. o Optical Thomson scattering diagnostics on NIF and Omega for hohlraum conditions, radiation channel flow, and discovery science. o Pinhole imaging along 3 lines-of-sight for 3D measurements of the burn in ICF capsules. o Time resolved neutron spectrum for determination of the rho-r and ion temperature evolution during the burn in ICF capsules. o Wolter optics for hard x-ray imaging.	• The increase supports the continued execution of the National Diagnostics Plan with primary focus to design, engineer, and implement transformation diagnostics at ICF/HED facilities. ▪ These improvements include: o Testing the first x-ray gated single line-of-site measurement on Omega. o Deployment of Optical Thomson-scattering diagnostics at NIF and Omega. o Development of Gallium-Arsenide diodes for x-ray detection on hCMOS cameras.

Inertial Confinement Fusion Ignition and High Yield
Pulsed Power Inertial Confinement Fusion

Description

This subprogram advances the science and technology associated with pulsed-power-driven implosions and corresponding platforms. The subprogram supports the Priority Research Directions (PRD) for magnetically-driven ICF, as well as a combination of focused and integrated experiments to address uncertainties in: (1) direct-drive approaches, such as the magnetized liner (MagLIF), and (2) x-ray driven platforms, such as the double-ended and the dynamic hohlraum platforms. Support for this major technical effort (MTE) focuses on pulsed-power and includes experimental design and simulation, research and development, fielding experiments for platforms and data analyses, and improvement in pulsed-power capabilities and tools. One objective of this subprogram is to determine the requirements for an advanced pulsed-power driver capable of achieving high-yield fusion. The core requirements for this subprogram are described in the SSMP, the Ten Year HED Strategic Plan, the National Diagnostics Plan, and the Five Year National ICF Program Framework.

Science, ASC, DSW, and other stockpile program elements are informed by, and in some cases benefit from, the capabilities developed by this subprogram to successfully execute respective SSMP responsibilities.

Pulsed Power Inertial Confinement Fusion

Activities and Explanation of Changes

FY 2016 Enacted	FY 2018 Request	Explanation of Changes FY 2018 vs FY 2016
Pulsed Power Inertial Confinement Fusion **$4,963,000**	**Pulsed Power Inertial Confinement Fusion** **$7,596,000**	**Pulsed Power Inertial Confinement Fusion** **+$2,633,000**
• Evaluate, through small scale experiments, the mechanism by which Magneto Rayleigh Taylor instabilities are seeded in magnetically driven linear implosions. • Document and pursue programs of laser heating experiments relevant to MagLIF (e.g., on Omega-EP, Z-Beamlet). Programs include focused experiments on understanding the relevant physics (e.g., laser propagation in magnetized gasses) and optimization experiments aimed at increasing coupling of laser energy to deuterium fuel. • Document a multi-year campaign of target preconditioning experiments on multiple NNSA laser facilities, and document a plan for depositing >4kJ. • Assess, based on validated 2- and 3-dimensional simulations, magnetically driven target designs that could obtain fusion ignition on plausible next step pulsed power facilities.	• Driver-Target Coupling ▪ Improve understanding of convolute physics, current pulse shaping, and current delivery to small radii in order to improve the efficiency of power delivery to the target. • Target Preconditioning ▪ Improve models for laser fuel heating, fuel precompression, and electrothermal instabilities to minimize instabilities at the beginning of the implosion. • Implosions ▪ Study Magneto-Rayleigh-Taylor instabilities and dynamic mix in a target. • Stagnation and Burn ▪ Diagnose and model the fuel shape, density, and energy distribution in order to better understand mix, deceleration instabilities, and non-Maxwellian particle distributions. • Intrinsic and Transport Properties ▪ Conduct focused experiments to provide accurate equations-of-state for materials of interest over the range of relevant temperatures and pressures. • Integrate Modeling Approximations and Validation throughout the other five PRDs.	• The increase supports the enhanced exploration of magnetically-driven implosions. It supports MagLIF ICF target experiments for model validation and verification as well as laser energy and magnetic field sensitivity and parametric investigations.

Description

The Joint Program in High-Energy Density Laboratory Plasmas (HEDLP) is a joint effort with the DOE's Office of Science to support basic HED research that strengthens the science, technology, and engineering base. This subprogram provides support for external users at the Omega Laser Facility through the National Laser Users' Facility (NLUF) Program and also support joint solicitation with the Office of Science for HEDLP research to be performed at universities and DOE laboratories. It includes some of the HED-related Stockpile Stewardship Academic Alliances (SSAA) funding and other ICF-funded university programs. It funds academic programs to steward the study of laboratory HED plasma physics, maintain a cadre of qualified HED researchers outside of the national laboratories, and ensure the development of the next generation of specialized HED scientists to support future Stockpile Stewardship efforts.

Joint Program in High Energy Density Laboratory Plasmas

Activities and Explanation of Changes

FY 2016 Enacted	FY 2018 Request	Explanation of Changes FY 2018 vs FY 2016
Joint Program in High Energy Density Laboratory Plasmas $8,900,000	**Joint Program in High Energy Density Laboratory Plasmas $9,492,000**	**Joint Program in High Energy Density Laboratory Plasmas +$592,000**
• Continue support of High Energy Density Laboratory Plasma research through solicitations to fund individual investigator and research centers activities. Conducted solicitation for the NLUF Program. • Support the existing basic science research grants that are enabling academic participation in HED physics and increasing the cadre of qualified HED researchers who can comprise the future laboratory workforce.	• Continue on-going High Energy Density Laboratory Plasma research through solicitations to fund individual investigator and research centers activities. Conduct solicitation for the NLUF Program. • Continue support to existing basic science research grants that are enabling academic participation in HED physics and increasing the cadre of qualified HED researchers who can comprise the future laboratory workforce.	• The increase reflects continued support of the Joint Program in HEDLP, which is a joint effort with the DOE's Office of Science to support basic HED research that strengthens the science, technology, and engineering base. This work will also enable the program to collaborate with academic institutes on HED and ICF endeavors.

Inertial Confinement Fusion Ignition and High Yield
Facility Operations and Target Production

Description

ICF supports experimental work and safe, efficient operations at the ICF facilities, including highly specialized ICF capsule target research, design, engineering, and production. The Facility Operations and Target Production subprogram supports operational costs for the NIF, Omega, the Z facility, and the NIKE facility at NRL. This subprogram also supports fabrication and long-term applied R&D and engineering of sophisticated capsule targets required for ICF and HED weapons physics experiments. User meetings such as the Omega Laser Facility Users Group (OLUG) and the NIF Users Group, targeted cooperative agreements with external private and academic partners, and external meetings are sponsored by this subprogram. The core requirements for this subprogram are described in the Ten Year HED Strategic Plan, the National Diagnostics Plan, and the Five Year National ICF Program Framework.

Science, ASC, DSW, and other stockpile program elements are informed by, and in some cases benefit from, the capabilities developed by this subprogram to successfully execute the NNSA SSMP.

Facility Operations and Target Production

Activities and Explanation of Changes

FY 2016 Enacted	FY 2018 Request	Explanation of Changes FY 2018 vs FY 2016
Facility Operations and Target Production $339,423,000 • Maintains facility operations at NIF, Omega, Z, and Trident facilities. Continue highest priority experiments in support of the stockpile and on improving operational efficiencies. • Improve efficiency at NIF through implementation of final recommendations from the 120-Day Study. • At Trident (LANL), provide at least 550 target shots, and has tracked facility performance. • At NIF, operate safely and securely consistent with the NIF Governance Plan and following the NNSA strategic guidance and 120 day implementation plan. • At the Z-facility, operate safely and securely consistent with the Z Governance Plan and following NNSA guidance on shot allocation. Final shot allocation nominally follows NNSA guidance. • At Omega, operate consistent with the governance plan and based on shot allocation guidance from the NNSA.	**Facility Operations and Target Production $334,791,000** • Maintains facility operations at the NIF, Omega, and Z-facility. • Emphasize the highest priority experiments in support of the stockpile. • Improve in operational efficiency at all facilities and in target fabrication. • Conduct annual assessment of infrastructure and mission needs and recommend following fiscal year investments across all HED facilities. Perform radiographic platform development experiments using the Advanced Radiographic Capability.	**Facility Operations and Target Production -4,632,000** • Planned decrease reflects the shift of funds from the ICF Program to higher priority work scope within RDT&E.

Inertial Confinement Fusion Ignition and High Yield
Performance Measures

In accordance with the GPRA Modernization Act of 2010, the Department sets targets for, and tracks progress toward, achieving performance goals for each program.

	FY 2016	FY 2017	FY 2018
Performance Goal (Measure)	**High Energy Density Physics Research -** Cumulative percentage of progress towards completion of the high energy density physics research needed to support the nuclear weapons program as embodied in the Predictive Capability Framework (PCF).		
Target	20 % of progress (cumulative)	30 % of progress (cumulative)	40 % of progress (cumulative)
Result	Met - 20	TBD	TBD
Endpoint Target	By FY 2024, complete the ICF Program activities needed to complete the PCF pegposts, including demonstrating advanced burning plasma concepts that improve predictive capabilities and the application of physics for achieving ignition. These activities are performed in collaboration with the Science program within the Office of Research and Development.		

Inertial Confinement Fusion Ignition and High Yield
Capital Summary

	(Dollars in Thousands)						
	Total	Prior Years	FY 2016 Enacted	FY 2016 Current	FY 2017 Annualized	FY 2018 Request	FY 2018 vs FY 2016
Capital Operating Expenses Summary (including Major Items of Equipment (MIE))							
Capital Equipment >$500K (including MIE)	N/A	N/A	11,659	11,659	11,915	12,177	+518
Plant Projects (GPP and IGPP)	N/A	N/A	450	450	460	470	+20
Total, Capital Operating Expenses	**N/A**	**N/A**	**12,109**	**12,109**	**12,375**	**12,647**	**+538**
Capital Equipment > $500K (including MIE)							
Total Non-MIE Capital Equipment	N/A	N/A	11,659	11,659	11,915	12,177	+518
Total, Capital Equipment (including MIE)	**N/A**	**N/A**	**11,659**	**11,659**	**11,915**	**12,177**	**+518**
Plant Projects (GPP and IGPP)							
Total Plant Projects (GPP/IGPP) (Total Estimated Cost (TEC) <$5M)	N/A	N/A	450	450	460	470	+20
Total, Plant Projects (GPP/IGPP)	**N/A**	**N/A**	**450**	**450**	**460**	**470**	**+20**
Total, Capital Summary	**N/A**	**N/A**	**12,109**	**12,109**	**12,375**	**12,647**	**+538**

* The FY 2017 Annualized CR amounts reflect the P.L. 114-254 continuing resolution level annualized to a full year. These amounts are shown only at the congressional control level and above, below that level, a dash (-) is shown.

Advanced Simulation and Computing

Overview

The Advanced Simulation and Computing (ASC) program provides high-end simulation capabilities (*i.e.,* modeling codes, computing platforms, and supporting infrastructure) to meet the requirements of the Stockpile Stewardship Program (SSP). Modeling the extraordinary complexity of nuclear weapons systems is essential to maintaining confidence in the performance of our aging stockpile without underground testing. The ASC program underpins the integrated assessment capability supporting Annual Assessment and future sustainment program certification of the stockpile, and is an integral element of the Predictive Capability Framework, as described in the FY 2017 Stockpile Stewardship Management Plan (SSMP). ASC also provides critical capabilities that help inform decision-making related to the sustainment of the nuclear stockpile and future stockpile reductions in support of U.S. nonproliferation objectives.

The ASC capabilities are used to address areas of national security in addition to the U.S. nuclear stockpile. Through coordination with other Government agencies that independently fund these services, and other organizations within the National Nuclear Security Administration (NNSA), ASC plays important roles in supporting nonproliferation, emergency response, nuclear forensics, and attribution activities.

The FY 2018 objectives include the following:

- Support assessments, certification, significant finding investigations (SFI), both current and future sustainment programs including alterations (ALTs), modifications (Mods), and life extension programs (LEPs);
- Support the objective to field a usable exascale computer system for national security missions;
- Influence and respond to rapid technological changes in the computing industry; and
- Improve physics models to support current and future NNSA goals (such as primary and secondary reuse; weapons safety, security, and survivability improvements; advanced manufacturing of components; and broader nuclear security applications) without nuclear testing.

In July 2015, the program published a comprehensive ASC Program Business Plan that describes the essential elements of the ASC program and provides context for the program as a necessary component of the science-based SSP. It details the essential elements including the program's structure, its clear definition of roles and responsibilities, and its investment in tools and people. The plan reinforces the critical importance of a consistent investment in the work scope of the NNSA nuclear security laboratories and emphasizes the benefits of productive partnerships with the DOE Office of Science Advanced Scientific Computing Research (ASCR) program, with vendors from within the computing industry, and with academic institutions. The ASC Program Business Plan documents the planning, tracking and oversight that coordinates this science-based enterprise.

The ASC program requests $734,244,000 in FY 2018, an $111,238,000 increase from the FY 2016 Enacted Level. The requested increase funds program requirements that transition integrated codes to work efficiently on emerging high-performance computers; develop next-generation codes; maintain computing resources and facilities; and importantly, resource work with industry to assure NNSA requirements continue to be addressed as high-performance computing evolves. These capabilities are necessary to inform the annual assessment of the nuclear stockpile. Included in this Budget Request is $161,000,000 for activities and research leading to deployment of exascale capability for national security applications in the early 2020s. Of this amount, $3 million is for the Exascale Computing Facility Modernization (ECFM) Project at the Lawrence Livermore National Laboratory, which will provide facility preparations and infrastructure to site an exascale-class system.

The drivers of the ASC program that require this budget include the Nuclear Weapons Council approval of the Baseline Strategic Plan, a key part of the "3+2 Strategy." Supporting the 3+2 Strategy requires further developed simulation and computing capabilities to improve understanding of energy balance, boost, and equations of state for materials and other relevant phenomena of interest. Annual assessments, sustainment programs, and SFIs are drivers that require responsive modeling and simulation capabilities to better understand the impact of environmental and system conditions, including aging, and the resolution of historical nuclear test anomalies. Investing in physics improvements in the Integrated Design Codes (IDCs) will open design options for subsystem components for future sustainment programs. A third driver is the need to adapt current capabilities to evolving high performance computer architectures and sustaining/improving modeling and simulation capabilities for the long-term.

The ASC computing capabilities are the key integrating mechanism across the nuclear weapons program through the IDCs. The assessment of the nation's stockpile requires high-fidelity physical models. The IDCs support design studies, maintenance analyses, the Annual Assessment Reports, sustainment programs, SFIs, and weapons dismantlement activities. IDCs contain the mathematical descriptions of the physical processes of nuclear weapon systems and functions. Combined with weapon-specific data, the IDCs provide detailed simulations of nuclear weapons performance assessment without the need for nuclear testing. Since the 1992 nuclear weapons testing moratorium, IDCs embody the repository of data from experiments conducted at the NNSA's high energy density facilities and legacy underground nuclear tests, as well as the accumulated experience of the Directed Stockpile Work (DSW) program user community. The IDCs currently perform well for general mission-related activities; however, as aging takes the current stockpile further away from the data collected from underground tests, maintaining the nuclear weapons stockpile will require IDCs with enhanced predictivity and use High Performance Computing (HPC) resources more effectively.

The global shift in fundamental computing architecture is an increasingly urgent driver for simulation and computing investments. ASC capabilities that support the DSW mission are beginning to experience the effects of obsolescence as high performance computing technologies continue to advance and evolve to radically different and more complex architectures (e.g. massive parallelism, heterogeneous, and memory limiting). Maintaining currency with the commercial information technology sector will advance high-fidelity physics modeling capabilities required to maintain a credible deterrent and will address additional mission needs in non-proliferation, emergency response, nuclear forensics, and attribution programs. ASC is focused on minimizing the disruptive mission impact of this change in HPC.

The ASC strategy for acquiring the advanced computing technologies, needed to support current and future stockpile work, fully recognizes the need to pursue exascale computing capabilities. In this Budget Request, the ASC program HPC technologies scope contributes to the foundation for an exascale supercomputer capability for the nation. The Advanced Technology Development and Mitigation (ATDM) subprogram consolidates the investments Congress directed for exascale in FY 2014, into a unified effort to tackle challenges facing ASC in its support of stockpile stewardship and upon which future efforts can build. The technical problems facing the program today are a subset of the issues exascale will need to overcome to be successful. Therefore, investments in ATDM advance both exascale technologies and stockpile computing effectiveness. The ASC strategy is coordinated closely with the DOE's Office of Science ASCR program in the development and oversight of the Department's Exascale initiative.

Highlights of the FY 2018 Budget Request

- Support the development of exascale-class computing and associated software and applications.
- Deliver the Sierra (LLNL) system and operate the ASC Trinity (LANL) in classified environment.
- Preserve the current integrated design codes.
- Prepare the current ASC facilities, national laboratory computing centers, for the next-generation platforms.

FY 2016 Accomplishments

- LLNL completed L2 milestone to "Deploy Commodity Technology System-1 (CTS-1) Test Bed (Hype)" in FY 2016 Q3. This test bed allowed for the complete testing of the ASC software stack that will be running on the tri-lab CTS-1 systems at three NNSA labs, providing computing capacity and throughput for Stockpile Stewardship Program and DSW work.
- LLNL Building 654 underwent final acceptance, including final testing and commissioning tests; a formal dedication ceremony was held June 29, 2016. Building 654 is a new, dual-level modular facility and consists of a 6,000-square foot machine floor flanked by support space. It now houses new platforms that will provide LLNL researchers and their collaborators greater access to the high performance computing capabilities they need to perform their national security work.
- Trinity, Advanced Technology HPC system ("Haswell" partition) at LANL became available for classified use. Trinity is the next step forward in computational power since the 41-petaFLOP system will provide a large portion of the computing resources for the NNSA labs in 2016–2020, in support of the largest and most demanding ASC applications for the Stockpile Stewardship and DSW missions.

- LANL's upgrades to computational capabilities for nuclear criticality safety assessments contributed to resumption of operations at PF-4.
- LLNL completed L2 milestone to “Demonstrate a New Embedded Smooth Particle Hydrodynamic Capability” on a programmatically relevant simulation of an upcoming experiment. This milestone enabled the integration of more than one simulation scheme in a unique way.
- SNL developed a model based on the DNA Nuclear Blast Standard, potentially reducing qualification test levels or increasing experimental test margins for strategic systems in the stockpile.
- SNL discovered a new mechanism, bubble depressurization, by which foam-filled parts age.

Advanced Simulation and Computing
Funding

	(Dollars in Thousands)			
	FY 2016 Enacted	**FY 2017 Annualized CR***	**FY 2018 Request**	**FY 2018 vs FY 2016**
Research, Development, Test and Evaluation				
Advanced Simulation and Computing				
Integrated Codes	149,189	151,055	151,848	+2,659
Physics and Engineering Models	67,819	68,141	66,851	-968
Verification and Validation	52,878	53,002	51,074	-1,804
Advanced Technology Development and Mitigation (ATDM)	**64,000**	**104,308**	**158,000**	**+94,000**
Construction	**0**	**0**	**25,000**	**+25,000**
Subtotal, ATDM	**64,000**	**104,308**	**183,000**	**+119,000**
Computational Systems and Software Environment	120,837	106,363	121,490	+653
Facility Operations and User Support	168,283	165,226	159,981	-8,302
Total, Advanced Simulation and Computing	**623,006**	**648,095**	**734,244**	**+111,238**

* The FY 2017 Annualized CR amounts reflect the P.L. 114-254 continuing resolution level annualized to a full year. These amounts are shown only at the congressional control level and above, below that level, a dash (-) is shown.

Advanced Simulation and Computing
Explanation of Major Changes
(Dollars in Thousands)

	FY 2018 vs FY 2016
Advanced Simulation and Computing	
Integrated Codes (IC): Increase reflects resources shifted from PEM and V&V to support migration of simulation tools to new architectures.	+2,659
Physics and Engineering Models (PEM): Decrease reflects shift of resources to IC.	-968
Verification and Validation (V&V): Decrease reflects shift of resources to IC.	-1,804
Advanced Technology Development and Mitigation (includes Construction): Increase continues next-gen code development and evaluates performance on advanced hardware test beds. Pursues technologies critical to an exascale capability for the nation.	+119,000
Computational Systems and Software Environment: Increase reflects normal fluctuations in platform procurement profiles**.**	+653
Facility Operations and User Support: Decrease reflects transfer of funds to the construction line item.	-8,302
Total, Advanced Simulation and Computing	**+111,238**

Advanced Simulation and Computing
Integrated Codes

Description

Integrated codes (IC) contain the mathematical descriptions of the physical processes of nuclear weapon systems and functions. Combined with weapon-specific input data created by the nuclear weapons designers and engineers, IC provides detailed simulations of nuclear weapons performance assessment, without the need for underground nuclear testing. The IC subprogram funds the critical skills needed to develop, maintain, and advance the capabilities of the large-scale integrated simulation codes that are needed for the following SSP and DSW activities: on-going predictive capability based assessments; annual assessment; sustainment program reuse/remanufacture design decisions, qualification, and certification; SFI resolution; and safety assessments to support transportation and dismantlement. In addition, these capabilities are necessary for a host of related requirements such as nuclear counter-terrorism efforts (e.g. nuclear forensics, foreign assessments, and device disablement techniques).

The Predictive Science Academic Alliance Program 2 (PSAAP2), funded from the IC subprogram, will continue at six universities (University of Utah, University of Illinois-Urbana-Champaign, Stanford University, and University of Florida, Texas A&M University, and University of Notre Dame).

ASC's contribution to the Computational Science Graduate Fellowships will continue as part of a joint DOE Office of Science ASCR collaboration.

Integrated Codes

Activities and Explanation of Changes

FY 2016 Enacted	FY 2018 Request	Explanation of Changes FY 2018 vs FY 2016
Integrated Codes $149,189,000	**Integrated Codes $151,848,000**	**Integrated Codes +$2,659,000**
Ongoing user support and maintenance • Code builds and ports. • As needed, user training and assistance. • Regularly scheduled testing and bug fixes. Capability development • Improve nuclear performance assessment codes for boost and secondary performance. • Improve safety codes to address multi-point safety issues. • Improve engineering assessment codes for normal, abnormal, and hostile environments. • Adapt existing codes to new architectures. • Migrate current design and safety codes to run efficiently on hybrid computer architectures. • Support the Kansas City National Security Campus in the use of ASC codes and computing resources to solve production manufacturing problems. Workforce and accession • Maintain mentoring program for early career staff. • Collaborate with PSAAP2 centers on technical topics and staff recruitment.	Ongoing user support and maintenance • Code builds and ports. • As needed, user training and assistance. • Regularly scheduled testing and bug fixes. Capability development • Further develop nuclear performance assessment codes for boost and secondary performance, safety codes to address multi-point safety issues, engineering assessment codes for hostile environments, and engineering assessment codes for normal and abnormal environments. • Adapt existing codes to new architectures. • Migrate current design and safety codes to run efficiently on hybrid computer architectures. • Support the Kansas City National Security Campus in the use of ASC codes and computing resources to solve production manufacturing problems. Workforce and accession • Maintain mentoring program for early career staff. • Collaborate with PSAAP2 centers on technical topics and staff recruitment.	• Increase reflects resources shifted from PEM and V&V to support migration of simulation tools to new architectures

Advanced Simulation and Computing
Physics and Engineering Models

Description

The Physics and Engineering Models (PEM) subprogram provides the models and databases used in simulations supporting the U.S. stockpile. These models and databases describe a wide variety of physical and engineering processes occurring in a nuclear weapon life-cycle. The capability to accurately simulate these processes is required for annual assessment; design, qualification, and certification of warheads undergoing sustainment programs; resolution (and in some cases generation) of SFIs; and the development of future stockpile technologies. The PEM subprogram is closely linked to the Science program within the Office of Defense Programs, Research, Development, Test, and Evaluation, which provides the experimental data that informs development of new models used in simulation codes.

Physics and Engineering Models

Activities and Explanation of Changes

FY 2016 Enacted	FY 2018 Request	Explanation of Changes FY 2018 vs FY 2016
Physics and Engineering Models $67,819,000	**Physics and Engineering Models $66,851,000**	**Physics and Engineering Models -$968,000**
Model Development • Further develop reactive flow models for high explosive (HE) detonation and burn that capture grain scale material heterogeneity and are computationally efficient. • Refine models for complex hydrodynamic processes that are sufficiently predictive to help the design and assessment of various stockpile options. • Refine models needed for certification on new safety options. • Adapt/develop models for components built by advanced/adaptive manufacturing techniques.	Model Development • Further develop reactive flow models for HE detonation and burn that capture grain scale material heterogeneity and are computationally efficient. • Develop additional models for complex hydrodynamic processes that are sufficiently predictive to help the design and assessment of various stockpile options. • Further refinement of models needed for certification on new safety options. • Continue to adapt/develop models for components built by advanced/adaptive manufacturing techniques.	• Decrease reflects shift of resources to IC

Advanced Simulation and Computing
Verification and Validation

Description

The Verification and Validation (V&V) subprogram provides evidence that the models in the codes produce mathematically correct answers that reflect physical reality. The V&V subprogram funds the critical skills needed to apply systematic measurement, documentation, and demonstration of the ability of the models and codes to predict physical behavior. The V&V subprogram is developing and implementing uncertainty quantification (UQ) methodologies as part of the foundation for the Quantification of Margins and Uncertainties (QMU) process of weapons assessment and certification. The V&V subprogram also drives software engineering practices to improve the quality, robustness, reliability, and maintainability of the codes that evaluate and address the unique complexities of the stockpile. As the stockpile ages, and as weapons designers with test experience leave the nuclear security enterprise, it has become increasingly important that the codes are verified and validated, so that future generations of designers are confident in the use of these foundational tools.

During the planning period, V&V efforts will enhance our abilities in dealing with complex safety and engineering issues with the nuclear weapons stockpile. With major modifications to adapt existing codes to future hardware a primary focus of the IC subprogram, and development of new codes a primary focus of the ATDM subprogram, the primary focus for the V&V subprogram will be ensuring the modifications and new codes are subjected to thorough verification and validation methodologies.

Verification and Validation

Activities and Explanation of Changes

FY 2016 Enacted	FY 2018 Request	Explanation of Changes FY 2018 vs FY 2016
Verification and Validation $52,878,000	**Verification and Validation $51,074,000**	**Verification and Validation -$1,804,000**
Verification and Validation • Verify improvements in nuclear performance codes. • Verify improvement in safety codes to address multi-point safety issues. • Validate improvements to physics and material models. • Verify improvements in engineering codes for normal/abnormal/hostile environments. • Broaden development of V&V protocols for algorithms running on hybrid HPC architectures. Predictive Capability Assessment • Assess predictive capability as improvements to codes and models, including new nuclear material data, are made available • Ongoing development of the primary and secondary common models. On-going user support and training • Provide training on the use of UQ tools. • Implement quality assurance controls to ensure material and nuclear databases are correctly updated and maintained.	Verification and Validation • Verify improvements in nuclear performance codes. • Verify improvement in safety codes to address multi-point safety issues. • Validate improvements to physics and material models. • Verify improvements in engineering codes for normal/abnormal/hostile environments. • Broaden development of V&V protocols for algorithms running on hybrid HPC architectures. Predictive Capability Assessment • Assess predictive capability as improvements to codes and models, including new nuclear material data, are made available • Ongoing development of the primary and secondary common models. On-going user support and training • Provide training on the use of UQ tools. • Implement quality assurance controls to ensure material and nuclear databases are correctly updated and maintained.	• Decrease reflects shift of resources to IC.

Advanced Simulation and Computing
Advanced Technology Development and Mitigation

Description

The Advanced Technology Development and Mitigation (ATDM) sub-program includes laboratory code and computer engineering and science projects that support long-term simulation and computing goals relevant to both exascale computing and the broad national security missions of the NNSA.

ASC capabilities that support the DSW mission are challenged, as high performance computing (HPC) technologies are evolving to radically different and more complex (many-core, heterogeneous) architectures. The efficiency of the current generation of integrated design codes (IDCs) is deteriorating as these codes are migrated to the latest HPC platforms. This trend is expected to continue and accelerate on future platforms unless mitigated. The sub-program must address three major challenges: 1) the radical shift in computer architectures, 2) maintaining the current IDCs took more than a decade to develop and validate, and 3) adapting current capabilities as evolving computer technologies become increasingly disruptive to the broad national security missions of NNSA.

The ATDM sub-program tackles the most critical subset of issues that are occurring during this period of disruptive change in HPC architectures in order to continue the current level of support to the DSW mission. There are three focus areas for investment. Next Generation Code Development and Application is focused on long-term investigation of how future code development must address new HPC challenges of massive, heterogeneous parallelism using new programming models and data management techniques developed through co-design of applications and systems with industry. Next Generation Architecture and Software Development is focused on computing technology research of extreme, heterogeneous architectures, mitigating its impact and advancing its capabilities for ASC simulation codes. Inter-agency Co-Design will leverage NNSA HPC advanced architecture activities and software technologies to address the sponsor agencies' mission needs. The other agencies will also have the opportunity to participate in co-design activities with vendors and academia, in addition to workforce development and training opportunities.

Advanced Technology Development and Mitigation

Activities and Explanation of Changes

FY 2016 Enacted	FY 2018 Request	Explanation of Changes FY 2018 vs FY 2016
Advanced Technology Development and Mitigation $64,000,000	**Advanced Technology Development and Mitigation $158,000,000**	**Advanced Technology Development and Mitigation +$94,000,000**
• Develop next generation of programming models and ASC physics & engineering codes • Improve proxy applications and to enhance vendor interactions. • Deploy advanced hardware test beds to assist in the performance analysis of the next- generation codes. • Execute Trinity Application Center of Excellence collaboration with system vendor. • Incorporate Sierra's burst buffer, compiler development, power management, application readiness. • Jointly manage with DOE Office of Science the exascale PathForward projects.	• Expand development of next generation programming models and ASC physics & engineering codes • Improve NNSA proxy applications and to enhance co-design interactions with computer vendors. • Deploy advanced hardware test beds to assist in the performance analysis of the next- generation codes. • Continue execution Trinity Application Center of Excellence collaboration with system vendor. • Continue incorporation of Sierra's burst buffer, compiler development, power management, application readiness. • Jointly manage with DOE Office of Science the exascale PathForward projects. • Initiate acquisition of peta-flop class, ARM-based testbed to evaluate the technology.	• Accelerate development of next generation integrated design code (+$9,000,000). • Commence development of simulation capabilities to evaluate hostile environment response (+$6,000,000). • Develop compilers and tools (+$7,000,000). • Co-design next-generation hardware and software with industry (PathForward) (+$14,000,000). • Procure first half of peta-scale class ARM testbed (+$13,000,000). • Develop software stack for the ARM testbed (+$5,000,000). • Prepare computing facilities at the NNSA labs to host the incoming advanced hardware. (+$9,000,000). • Transfer to the Computational Systems and Software Environment subprogram investment in quantum and neuromorphic computing as areas of interest in which to build momentum. • Augment existing co-design efforts including government-wide collaborations. • Broaden algorithmic approaches and enhance computational mathematical libraries. • Incorporate next-generation computing technologies investments from the Computational Systems and Software Environment subprogram as key components of delivering an exascale system (+$31,000,000).

Advanced Simulation and Computing
Computational Systems and Software Environment

Description

The Computational Systems and Software Environment (CSSE) subprogram procures and integrates the computing systems needed for weapons simulations. Since stockpile requirements drives the program's need to achieve its predictive capability goals, the ASC program must invest in and consequently influence the evolution of computational environments. Along with the powerful Commodity and Advanced Technology systems that the program fields, the supporting software infrastructure that is deployed on these platforms includes many critical components, from system software to input/output (I/O), storage and networking, and post-processing visualization and data analysis tools. CSSE also examines possible future technologies beyond exascale, such as quantum, neuromorphic, and non- complementary metal-oxide-semiconductor (CMOS)-based computing techniques.

Computational Systems and Software Environment

Activities and Explanation of Changes

<table>
<tr><th>FY 2016 Enacted</th><th>FY 2018 Request</th><th>Explanation of Changes
FY 2018 vs FY 2016</th></tr>
<tr><td>Computational Systems and Software Environment $120,837,000</td><td>Computational Systems and Software Environment $121,490,000</td><td>Computational Systems and Software Environment +$653,000</td></tr>
<tr><td>Platform Operations
• Provide Sequoia and Cielo operations.
• Transition Trinity Haswell partition into classified computing environment.
• Continue providing Tri-lab Linux Capacity Cluster 2 (TLCC2) system operations.
• Deploy Trinity with the Knights Landing partition
• Initiate deployment of CTS1 systems.
• Decommission Cielo at year end.

Capability Development
• Support ASC code teams in the porting and scaling of applications on to Trinity.
• Further develop tri-lab computing environment consisting of user tools, networks, file system, archival storage, and visualization and data analysis.
• Provide oversight of the jointly funded NNSA and DOE ASCR FastForward and DesignForward projects.</td><td>Platform Operations:
• Continue deployment of CTS1 systems.
• Continue deployment of ASC Sierra hardware with anticipated system acceptance Q4 FY 2018.
• Provide Trinity’s maintenance contract.
• Initiate Crossroads Center of Excellence with system vendor on high-bandwidth memory, novel power management and advanced programming models.
• Initiate procurement of ATS-4 for system delivery in 2023.

Capability Development:
• Support ASC application porting and scaling on to Trinity and Sierra’s Early Access Systems.
• Further development of tri-lab computing environment consisting of user tools, networks, file system, archival storage, and visualization and data analysis.
• Fund and evaluate the suitability of various post-CMOS technologies, such as quantum and neuromorphic computing, to NNSA’s national security mission.</td><td>• Increase reflects normal fluctuations in platform procurement profiles.</td></tr>
</table>

Advanced Simulation and Computing
Facility Operations and User Support

Description

The Facility Operations and User Support (FOUS) subprogram provides the facilities and services required to provide nuclear weapons simulations. Facility Operations includes physical space, power, and other utility infrastructure, and Local Area/Wide Area Networking for local and remote access, as well as system administration, cyber-security, and operations services for ongoing support. User Support includes computer center hotline and help-desk services, account management, web-based system documentation, system status information tools, user training, trouble-ticketing systems, common computing environment, and application analyst support.

Facility Operations and User Support

Activities and Explanation of Changes

FY 2016 Enacted	FY 2018 Request	Explanation of Changes FY 2018 vs FY 2016
Facility Operations and User Support $168,283,000	**Facility Operations and User Support $159,981,000**	**Facility Operations and User Support -$8,302,000**
Continued User Support • Incorporate the Trinity system into web documentation, user manuals, technical bulletins, training, hotline, and help desk support for ASC users. Continue Sequoia and TLCC2 support. • Pursue a common computing environment for users. • Maintain maximum availability of computer cycles to end users. Implement best practices. • Provide operational support for reliable and secure production computing environment. • Decommission TLCC1s: Typhoon, Sierra, Juno, and Muir. Ongoing Capability Deployment • Implement contingency response plans, as necessary. • Deploy the needed file system and archival storage technologies.	Continued User Support • Continue full operation of CTS1 systems. • Pursue a common computing environment for users. • Maintain maximum availability of computer cycles to end users. Implement best practices. • Provide operational support for reliable and secure production computing environment. • Prepare for incorporation of next generation architectures. Ongoing Capability Deployment • Implement contingency response plans, as necessary. • Deploy the needed file system and archival storage technologies. • Conduct facility assessment for future operations.	• Decrease reflects transfer of funds to the construction line item.

Advanced Simulation and Computing
Construction

Description

The Construction program plays a critical role in NNSA's Exascale Computing program. Funding is requested for Exascale Class Computer Cooling Equipment (ECCCE) at the Los Alamos National Laboratory Nicholas C. Metropolis Center for Modeling and Simulation, also known as the Strategic Computing Complex (SCC). This project is an expansion of the SCC's existing warm water cooling system. The ECCCE Project will use open-cell cooling towers that cool the water via evaporation, and will provide needed cooling capability for an Exascale Class Machine at LANL. This project will provide a minimum of 3,800 tons (13.4MW) of additional warm water cooling capacity at the SCC by installing five additional open celled cooling towers to the north of the existing towers, extending the process loop piping to the east of the existing piping loop, add six process water pumps and four heat exchangers, and associated large diameter piping. The project will also include the installation of supporting electrical equipment and components necessary for the function of the mechanical equipment as well as additions to the building's automated control system. FY 2018 funds will be used to acquire materials and components for this construction.

Additionally, funding is requested for the Exascale Computing Facility Modernization (ECFM) Project. The purpose of the ECFM Project at the Lawrence Livermore National Laboratory is to provide capable facilities and infrastructure to site an exascale-class system. The requested funding will cover the Other Project Costs (OPCs) associated with this project and will also cover design work associated with this project, as Total Estimated Costs (TECs).

Construction

FY 2016 Enacted	FY 2018 Request	Explanation of Changes FY 2018 vs FY 2016
Construction $0	**Construction $25,000,000**	**Construction +$25,000,000**
• The ECCCE project was included as a Major Item of Equipment (MIE) in FY 2016.	• The ECCCE project was previously included in the FY 2017 budget as a MIE under the Advanced Simulation and Computing (ASC) Program. • The FY 2018 budget includes both TEC and OPC funding for ECFM.	• This is the first year of funding for line-item construction projects.

Advanced Simulation and Computing
Performance Measures

In accordance with the GPRA Modernization Act of 2010, the Department sets targets for, and tracks progress toward, achieving performance goals for each program.

	FY 2016	FY 2017	FY 2018
Performance Goal (Measure)	**Reduced Reliance on Calibration -** The cumulative percentage reduction in the use of calibration "knobs" to successfully simulate nuclear weapons performance.		
Target	53 % cumulative reduction in the use of calibration "knobs"	60 % cumulative reduction in the use of calibration "knobs"	63 % cumulative reduction in the use of calibration "knobs"
Result	Met - 53	TBD	TBD
Endpoint Target	By the end of FY 2024, 100% of selected calibration knobs (non-science based models) affecting weapons performance simulation have been replaced by science-based, predictive phenomenological models. Reduced reliance on calibration will ensure the development of robust ASC simulation tools. These tools, with support from the next-generation computational technologies resulted from NNSA's investments in the Exascale Computing Initiative, are intended to enable the understanding of the complex behaviors and effect of nuclear weapons, now and into the future, without nuclear testing.		

Advanced Simulation and Computing
Capital Summary

(Dollars in Thousands)

	Total	Prior Years	FY 2016 Enacted	FY 2016 Current	FY 2017 Annualized CR*	FY 2018 Request	FY 2018 vs FY 2016	Outyears to Completion
Capital Operating Expenses Summary (including Major Items of Equipment (MIE))								
Capital Equipment >$500K (including MIE)	N/A	N/A	195,476	195,476	210,860	189,415	-6,061	N/A
Plant Projects (GPP and IGPP)	N/A	N/A	5,165	5,165	5,279	5,395	+230	N/A
Total, Capital Operating Expenses	**N/A**	**N/A**	**200,641**	**200,641**	**216,139**	**194,810**	**-5,831**	**N/A**
Capital Equipment > $500K (including MIE)								
Total Non-MIE Capital Equipment	N/A	N/A	117,176	117,176	119,754	122,389	+5,213	N/A
Exascale Class Computer Cooling Equipment, LANL [a]	19,800	0	8,800	8,800	11,000	0	0	0
Trinity (ATS-1) system, LANL	170,000	94,736	47,600	47,600	15,106	7,426	-40,174	5,132
Crossroads (ATS-3) system, LANL	170,000	0	0	0	9,000	13,400	+13,400	147,600
Physical Infrastructure Integration for Crossroads (PIIC), LANL	9,000	0	0	0	0	0	0	9,000
Sierra (ATS-2) System, LLNL	161,000	18,100	21,900	21,900	56,000	46,200	+24,300	18,800
Total, Capital Equipment (including MIE)	**N/A**	**N/A**	**195,476**	**195,476**	**210,860**	**189,415**	**2,739**	**180,532**
Plant Projects (GPP and IGPP)								
Total Plant Projects (GPP/IGPP) (Total Estimated Cost (TEC) <$5M)	N/A	N/A	5,165	5,165	5,279	5,395	230	N/A
B654 Livermore Computing Center	19,750	9,875	9,875	9,875	0	0	-9,875	0
B-453 Power Modernization	7,500	2,000	2,000	2,000	3,500	0	-2,000	0
B-453 Sierra Site Prep	3,000	0	0	5,000	3,000	0	0	0
Total, Plant Projects (GPP/IGPP)	**N/A**	**N/A**	**5,165**	**5,165**	**5,279**	**5,395**	**+230**	**N/A**
Total, Capital Summary	**N/A**	**N/A**	**212,516**	**217,516**	**222,639**	**194,810**	**-8,676**	**N/A**

* The FY 2017 Annualized CR amounts reflect the P.L. 114-254 continuing resolution level annualized to a full year. These amounts are shown only at the congressional control level and above, below that level, a dash (-) is shown.

[a] NNSA included this effort in the FY 2017 budget as a MIE under the Advanced Simulation and Computing (ASC) Program. For FY 2018, NNSA has requested two construction line items 18-D-670, Exascale Class Computer Cooling Equipment and 18-D-620, Exascale Computing Facility Modernization Project.

Advanced Simulation and Computing
Construction Projects Summary

(Dollars in Thousands)

	Total	Prior Years	FY 2016 Enacted	FY 2017 Annualized CR*	FY 2018 Request	FY 2018 vs FY 2017
18-D-670, Exascale Class Computer Cooling Equipment, LANL						
Total Estimated Cost (TEC)	66,989	2,338	0	0	22,000	+22,000
Other Project Cost (OPC)	3,802	2,359	0	0	0	0
Total Project Cost, 18-D-670, Exascale Class Computer Cooling Equipment, LANL	**70,791**	**4,697**	**0**	**0**	**22,000**	**+22,000**
18-D-620, Exascale Computing Facility Modernization Project, LLNL						
Total Estimated Cost (TEC)	92,000	0	0	0	3,000	+3,000
Other Project Cost (OPC)	5,000	2,000	0	0	2,000	+2,000
Total, Project Cost, 18-D-620, Exascale Computing Facility Modernization Project, LLNL	**97,000**	**2,000**	**0**	**0**	**5,000**	**+5,000**

* The FY 2017 Annualized CR amounts reflect the P.L. 114-254 continuing resolution level annualized to a full year. These amounts are shown only at the congressional control level and above, below that level, a dash (-) is shown.

Outyears to Completion for Advanced Simulation and Computing

	(Dollars in Thousands)			
	FY 2019 Request	**FY 2020 Request**	**FY 2021 Request**	**FY 2022 Request**
18-D-670, Exascale Class Computer Cooling Equipment, LANL				
Total Estimated Cost (TEC)	42,651	0	0	0
Other Project Cost (OPC)	1,249	194	0	0
Total, 08-D-670, Exascale Class Computer Cooling Equipment, LANL	**43,900**	**194**	**0**	**0**
18-D-620, Exascale Computing Facility Modernization Project, LLNL				
Total Estimated Cost (TEC)	40,000	44,000	8,000	0
Other Project Cost (OPC)	3,000	3,000	2,000	0
Total, Project Cost, 18-D-620, Exascale Computing Facility Modernization Project, LLNL	**43,000**	**47,000**	**10,000**	**0**
Total All Construction Projects				
Total Estimated Cost (TEC)	82,651	44,000	8,000	0
Other Project Cost (OPC)	4,249	3,194	2,000	0
Total Project Cost (TPC) All Construction Projects	**86,900**	**47,194**	**10,000**	**0**

18-D-670, Exascale Class Computer Cooling Equipment (ECCCE)
Los Alamos National Laboratory, Los Alamos, New Mexico
Project is for Design and Construction

Significant Changes and Summary

Significant Changes

While this Construction Project Data Sheet (CPDS) is new, the project is not. NNSA initiated this effort in FY 2016 as a Major Item of Equipment under the Advanced Simulation and Computing (ASC) Program. After further analysis, the decision was made to change the approach of the Project, and the funding classification has been revised to a Line Item Construction project. Funds previously appropriated for the MIE will be used to support project execution after corresponding Critical Decisions are met. Additionally, the estimate is subject to change as the program moves towards CD-1 approval and as final design is completed.

Summary

The most recent DOE O 413.3B approved CD is *CD-0, Approve Mission Need* was approved by the Project Management Executive on February 28, 2017. The CD-1 package has been updated with a Total Project Cost (TPC) range of $35M to $71M and a CD-4 approval with a range of 4Q FY 2019 to 1Q FY2021, which includes all schedule Management Reserve and Contingency. A Mission Need Statement, Program Requirements Document, and an independent Analysis of Alternatives (AoA) have been completed. All three of these documents have been approved by the Project Management Executive. NNSA has also completed an Independent Cost Estimate (ICE) and an Independent Project Review (IPR) for the Project. CD-1 approval is planned for 3Q 2017.

A certified Federal Project Director has been assigned to this Project and has reviewed this data sheet.

Through the independent AoA process, it was determined that the ECCCE Project will use open cell cooling towers that cool the water via evaporation.

Critical Milestone History

	CD-0	Conceptual Design Complete	CD-1	CD-2	Final Design Complete	CD-3	D&D Complete	CD-4
FY 2018	2/28/2017	7/29/2016	3QFY2017	3QFY2018	3QFY2018	3QFY2018	N/A	1QFY2021

CD-0 – Approve Mission Need for a construction project with a conceptual scope and cost range
Conceptual Design Complete – Actual date the conceptual design was completed (if applicable)
CD-1 – Approve Design Scope and Project Cost and Schedule Ranges
CD-2 – Approve Project Performance Baseline
Final Design Complete – Estimated/Actual date the project design will be/was complete(d)
CD-3 – Approve Start of Construction
D&D Complete –Completion of D&D work (see Section 9)
CD-4 – Approve Start of Operations or Project Closeout
PB – Indicates the Performance Baseline

Project Cost History

(dollars in thousands)

	TEC Design	TEC Construction	TEC Total	OPC Except D&D	OPC, D&D	OPC Total	TPC
FY 2018	7,962	59,027	66,989	3,802	N/A	3,802	70,791

Project Scope and Justification

Scope

This Project will provide a minimum of 3,800 tons (13.4MW) of additional warm water cooling capacity at the Nicholas C. Metropolis Center for Modeling and Simulation, otherwise referred to as the Strategic Computing Complex (SCC) by installing five additional open celled cooling towers to the north of the existing towers, extending the process loop piping to the east of the existing piping loop, add six process water pumps and four heat exchangers, and associated large diameter piping. The project will also include the installation of supporting electrical equipment and components necessary for the function of the mechanical equipment as well as additions to the building's automated control system.

Justification

The SCC currently has an installed warm-water cooling capability of 4,200 tons (14.8 MW).

In 2020, the estimated 8,000 tons (28.2 MW) minimum water cooling requirement for concurrent operation of two Advanced Technology supercomputers and a Commodity Technology System will exceed the existing cooling capability.

Due to the lead time required for designing and integrating new cooling infrastructure, along with the necessity of expanding system capacity prior to the delivery of next generation computing systems, prudent risk management calls for a warm-water computer cooling capability that at least meets the upper bounds of existing best estimates prior to delivery of Crossroads (the next generation Advanced Technology System) in 2020.

Funds appropriated under this data sheet may be used for contracted support services to the Federal Program Manager and the Federal Project Director to conduct independent assessments of the planning and execution of this Project required by DOE O 413.3B and to conduct technical reviews of design and construction documents.

The Project is being conducted in accordance with the project management requirements in DOE O 413.3B, Program and Project Management for the Acquisition of Capital Assets. As allowed by DOE O 413.3B, work will be phased to improve overall efficiency. OPCs are funded out of the Advanced Simulation and Computing program within RDT&E.

Financial Schedule

Total Project	(dollars in thousands)			
	Appropriations	Plan	Obligations	Costs
Total Estimated Cost (TEC)				
Design				
FY 2016	0	0	0	0
FY 2017[a]	2,338	2,338	2,338	2,338
FY 2018	3,659	3,659	3,659	3,659
FY 2019	1,965	1,965	1,965	1,965
FY 2020	0	0	0	0
Total, Design	**7,962**	**7,962**	**7,962**	**7,962**
Construction				
FY 2016	0	0	0	0
FY 2017	0	0	0	0
FY 2018	18,341	18,341	18,341	18,341
FY 2019	40,686	40,686	40,686	40,686
FY 2020	0	0	0	0
Total, Construction	**59,027**	**59,027**	**59,027**	**59,027**
TEC				
FY 2016	0	0	0	0
FY 2017	2,338	2,338	2,338	2,338
FY 2018	22,000	22,000	22,000	22,000
FY 2019	42,651	42,651	42,651	42,651
FY 2020	0	0	0	0
Total, TEC	**66,989**	**66,989**	**66,989**	**66,989**
Other Project Cost (OPC)				
OPC except D&D				
FY 2016[a]	1,775	1,775	1,775	1,775
FY 2017[a]	584	584	584	584
FY 2018	0	0	0	0
FY 2019	1,249	1,249	1,249	1,249
FY 2020	194	194	194	194
FY 2021	0	0	0	0
Total, OPC except D&D	**3,802**	**3,802**	**3,802**	**3,802**

[a] Consistent with the FY 2017 Congressional Budget Request, funding was included in the Consolidated Appropriations Act 2017 for the Exascale Class Computer Cooling Equipment as a major item of equipment. The Project Management Executive subsequently determined to change the approach of the project, and the funding classification has been revised to a line item construction project in the FY 2018 budget request.

(dollars in thousands)

	Appropriations	Plan	Obligations	Costs
Total Project Cost (TPC)				
FY 2016	1,775	1,775	1,775	1,775
FY 2017	2,922	2,922	2,922	2,922
FY 2018	22,000	22,000	22,000	22,000
FY 2019	43,900	43,900	43,900	43,900
FY 2020	194	194	194	194
FY 2021	0	0	0	0
Total, TPC	**70,791**	**70,791**	**70,791**	**70,791**

Details of Project Cost Estimate

(dollars in thousands)

	Current Total Estimate	Previous Total Estimate	Original Validated Baseline
Total Estimated Cost (TEC)			
Design	5,194	N/A	N/A
Project Management	300	N/A	N/A
Contingency	2,468	N/A	N/A
Total, Design	**7,962**	**N/A**	**N/A**
Total Design Contingency	**2,468**		
Construction			
Construction	51,737	N/A	N/A
Construction Management	1,471	N/A	N/A
Contingency	5,819	N/A	N/A
Total, Construction	**59,027**	**N/A**	**N/A**
Total, TEC	**66,989**	**N/A**	**N/A**
Contingency, TEC	**8,287**	**N/A**	**N/A**
Other Project Cost (OPC)			
OPC except D&D			
Conceptual Planning	0	N/A	N/A
Conceptual Design	2,359	N/A	N/A
Other OPCs including AB, Security, and PM Reviews	799	N/A	N/A
Contingency	644	N/A	N/A
Total, OPC except D&D	**3,802**	**N/A**	**N/A**
Contingency, OPC Except D&D	**644**		
D&D	0	N/A	N/A
Contingency	0	N/A	N/A
Total, D&D	**0**	**N/A**	**N/A**
Total, OPC	**3,802**	**N/A**	**N/A**
Contingency, OPC	**644**	**N/A**	**N/A**
Total, TPC - ECCE	**70,791**	**N/A**	**N/A**
Total, Contingency	**8,931**	**N/A**	**N/A**

Schedule of Appropriation Requests

(dollars in thousands)

Request		Prior Years	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	Total
FY 2018	TEC		2,338	22,000	42,651	0	0	0	66,989
	OPC	1,775	584	0	1,249	194	0	0	3,802
	TPC	1,775	2,922	22,000	43,900	194	0	0	70,791

Related Operations and Maintenance Funding Requirements

Beneficial Occupancy for Installation (fiscal quarter or date)	1QTR, FY2020
Expected Useful Life (number of years)	50
Expected Future Start of D&D of this capital asset (fiscal quarter)	N/A

(Related Funding requirements)

(dollars in thousands)

	Annual Costs		Life Cycle Costs	
	Current Total Estimate	Previous Total Estimate	Current Total Estimate	Previous Total Estimate
Operations	1,252	N/A	44,788	N/A
Utilities	434	N/A	15,531	N/A
Maintenance & Repair	417	N/A	14,926	N/A
Total	**2,103**	**N/A**	**75,246**	**N/A**

D&D Information

There is no new square footage being constructed with this Project.

Acquisition Approach

The ASC Program has contracted a Business Case Analysis (BCA) be conducted with respect to the Acquisition Strategy. This study was contracted at the recommendation of the Independent Project Review Team, which provided its findings to the ASC Program on January 27, 2017. At the recommendation of the study, the Project will be managed and construction executed by the LANL Management and Operating (M&O) contractor, due to on-going operations within the Los Alamos National Laboratory's SCC.

18-D-620, Exascale Computing Facility Modernization (ECFM)
Lawrence Livermore National Laboratory, Livermore, California
Project is for Design and Construction

Significant Changes and Summary

Significant Changes

This Construction Project Data Sheet (CPDS) is new and does include a new start for the budget year.

Summary

The most recent DOE O 413.3B approved Critical Decision (CD) is *CD-0, Approve Mission Need* was approved by the Project Management Executive on April 28, 2017, with a Total Project Cost (TPC) range of $27M to $107M and a CD-4 approval of 3Q FY2021, for the Exascale Computing Facility Modernization (ECFM) Project at the Terascale Simulation Facility at the Lawrence Livermore National Laboratory in Livermore, California. NNSA will complete an Independent Cost Estimate (ICE) and an Independent Project Review (IPR) for the Project. CD-1 approval is planned for 1Q 2018.

This Project is linked to the Exascale Computing Project, and the Program is working to ensure that Lawrence Livermore National Laboratory (LLNL) will have a facility capable of housing an anticipated future machine of this class.

A Federal Project Director has been assigned to this Project and has reviewed this data sheet.

Critical Milestone History

	CD-0	Conceptual Design Complete	CD-1	CD-2	Final Design Complete	CD-3	D&D Complete	CD-4
FY 2018	4/28/2017	05/10/2017	1QFY2018	4QFY2018	4QFY2018	1QFY2019	N/A	3QFY2021

CD-0 – Approve Mission Need for a construction project with a conceptual scope and cost range
CD-1 – Approve Design Scope and Project Cost and Schedule Ranges
CD-2 – Approve Project Performance Baseline
Final Design Complete – Estimated/Actual date the project design will be/was complete(d)
CD-3 – Approve Start of Construction
D&D Complete –Completion of D&D work (see Section 9)
CD-4 – Approve Start of Operations or Project Closeout
PB – Indicates the Performance Baseline

Project Cost History

(dollars in thousands)

	TEC Design	TEC Construction	TEC Total	OPC Except D&D	OPC, D&D	OPC Total	TPC
FY 2018	3,000	92,000	95,000	12,000	0	12,000	107,000

Project Scope and Justification

Scope

The proposed project would modify B453 at LLNL to accommodate the increased infrastructure demands of exascale computing platforms. Commissioned in 2004, Building 453 has been capable of housing the largest, most advanced classified systems to date but would require upgrades to the electrical, mechanical, and structural capabilities for these new systems. The project would alter approximately 60,000 ft2 of floor space in the facility. Load bearing steel columns and foundation and wall improvements would be added to increase the floor load limits to handle computing racks up to 7500 lbs. The existing cooling tower complex would be expanded by 12,500 tons of capacity, including required piping and pumps. Lastly, the existing electrical system will be upgraded to allow for an additional 45 MW of power, including the required feeders for mechanical and data systems, secondary electrical panels and feeders, and substation transformers, switchgear, switches and bussing.

Justification

The NNSA requires vastly more powerful computers to address increasingly challenging certification requirements associated with meeting the Stockpile Stewardship Program mission as the nuclear weapons stockpile ages. These next-generation computers will require unprecedented electrical power and cooling. In addition, compact architectures will demand higher rack densities that will exert floor weights substantially beyond current systems. Supporting future generations of computing systems, beginning in FY2022, will therefore impose requirements on NNSA facilities that exceed their current thresholds in terms of power, water, and structural floor loads.

The ASC has a mission need to acquire infrastructure capable of meeting the projected structural, electrical, and mechanical requirements for the new generation of computers by FY2021. Along with the necessity of expanding system capacity prior to the delivery of next generation computing systems, prudent risk management calls for an infrastructure necessary to accommodate new computer designs having increased requirements across an array of factors, including number of processors per system, density of processors per rack, and new approaches to power and cooling.

Funds appropriated under this data sheet may be used for contracted support services to the Federal Program Manager and the Federal Project Director to conduct independent assessments of the planning and execution of this Project required by DOE O 413.3B and to conduct technical reviews of design and construction documents.

The Project is being conducted in accordance with the project management requirements in DOE O 413.3B, Program and Project Management for the Acquisition of Capital Assets. As allowed by DOE O 413.3B, work will be phased to improve overall efficiency. OPCs are funded out of the Advanced Simulation and Computing program within RDT&E.

Financial Schedule

	(dollars in thousands)			
	Appropriations	**Plan**	**Obligations**	**Costs**
Total Project				
Total Estimated Cost (TEC)				
Design				
FY 2018	N/A	3,000	N/A	3,000
FY 2019	N/A	0	N/A	0
FY 2020	N/A	0	N/A	0
FY 2021	N/A	0	N/A	0
Total, Design		**3,000**		**3,000**
Construction				
FY 2019	N/A	40,000	N/A	10,000
FY 2020	N/A	44,000	N/A	70,000
FY 2021	N/A	8,000	N/A	12,000
Total, Construction		**92,000**		**92,000**
Total Estimated Cost (TEC)				
FY 2018	3,000	3,000	3,000	3,000
FY 2019	40,000	40,000	40,000	10,000
FY 2020	44,000	44,000	44,000	70,000
FY 2021	8,000	8,000	8,000	12,000
Total, TEC	**95,000**	**95,000**	**95,000**	**95,000**
Other Project Cost (OPC)				
OPC except D&D				
FY 2017	2,000	2,000	2,000	2,000
FY 2018	2,000	2,000	2,000	2,000
FY 2019	3,000	3,000	3,000	3,000
FY 2020	3,000	3,000	3,000	3,000
FY 2021	2,000	2,000	2,000	2,000
Total, OPC except D&D	**12,000**	**12,000**	**12,000**	**12,000**
Total Project Cost (TPC)				
FY 2017	2,000	2,000	2,000	2,000
FY 2018	5,000	5,000	5,000	5,000
FY 2019	43,000	43,000	43,000	13,000
FY 2020	47,000	47,000	47,000	73,000
FY 2021	10,000	10,000	10,000	14,000
Total, TPC	**107,000**	**107,000**	**107,000**	**107,000**

Details of Project Cost Estimate

(dollars in thousands)

	Current Total Estimate	Previous Total Estimate	Original Validated Baseline
Total Estimated Cost (TEC)			
Design	2,000	N/A	N/A
Project Management	500	N/A	N/A
Federal Support	200		
Contingency	300	N/A	N/A
Total, Design	**3,000**	**N/A**	**N/A**
Total Design Contingency	**300**		
Construction			
Construction	79,000	N/A	N/A
Construction Management	5,000	N/A	N/A
Federal Support	0		
Contingency	8,000	N/A	N/A
Total, Construction	**92,000**	**N/A**	**N/A**
Total, TEC	95,000	N/A	N/A
Contingency, TEC	8,300	N/A	N/A
Other Project Cost (OPC)			
OPC except D&D			
Conceptual Planning	3,000	N/A	N/A
Conceptual Design	2,000	N/A	N/A
Federal Support	5,000		
Contractor Support	500	N/A	N/A
Security	500		
Contingency	1,000	N/A	N/A
Total, OPC except D&D	**12,000**	**N/A**	**N/A**
Contingency, OPC Except D&D	**1,000**		
D&D	0	N/A	N/A
Contingency	0	N/A	N/A
Total, D&D	**0**	**N/A**	**N/A**
Total, OPC	**12,000**	**N/A**	**N/A**
Contingency, OPC	**1,000**	**N/A**	**N/A**
Total, TPC - ECFM	**107,000**	**N/A**	**N/A**
Total, Contingency	**9,300**	**N/A**	**N/A**

Schedule of Appropriation Requests

(dollars in thousands)

Request		FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	Total
FY 2018	TEC	0	3,000	40,000	44,000	8,000	0	95,000
	OPC	2,000	2,000	3,000	3,000	2,000	0	12,000
	TPC	2,000	5,000	43,000	47,000	10,000	0	107,000

Related Operations and Maintenance Funding Requirements

Beneficial Occupancy for Installation (fiscal quarter or date)	3Qtr, FY2021
Expected Useful Life (number of years)	50
Expected Future Start of D&D of this capital asset (fiscal quarter)	N/A

(Related Funding requirements)

(dollars in thousands)

	Annual Costs		Life Cycle Costs	
	Current Total Estimate	Previous Total Estimate	Current Total Estimate	Previous Total Estimate
Operations	16,860	N/A	60,600	N/A
Utilities	TBD	N/A	TBD	N/A
Maintenance & Repair	11,240	N/A	40,400	N/A
Total	**28,100**	**N/A**	**101,000**	**N/A**

D&D Information

There is no new square footage being constructed with this Project.

Acquisition Approach

The ASC Program will have the LLNL M&O execute Construction Management of this Project. Potentially a design-build contract on firm-fixed base may be awarded by the Management and Operating Contractor.

Advanced Manufacturing Development

Overview

The Advanced Manufacturing Development (AMD) Program develops, demonstrates, and transitions improved production processes. These include tools, fixtures, parts, and materials designed to ensure the safety, security, and performance of the nuclear weapons stockpile. AMD conducts developmental work to benefit the weapons complex while maintaining the base capability to respond to emerging issues with the current stockpile and adapting new processes for follow-on use, with the objective to provide significant reductions in production time, waste, and floor space requirements. In accomplishing its mission, the AMD Program enables the National Nuclear Security Administration (NNSA) to meet Department of Defense (DOD) requirements while enhancing safety and security and remaining vigilant and responsive to evolving national security requirements.

AMD is essential to NNSA's ability to support the current and long-term stockpile stewardship needs safely, efficiently, and cost effectively. The program significantly reduces cost and schedule risks associated with the improvement of manufacturing capabilities and deployment of technologies necessary to enhance production capabilities in the stockpile including components, materials, and processes. AMD must develop and evaluate a suite of advanced technologies before transitioning those technologies to other programs. Given the rigorous qualification requirements for nuclear weapons, it frequently takes 7 to 10 years to develop and test new components, which includes the manufacturing technologies used to produce those components. Accordingly, this process must begin prior to commencement of a Life Extension Program (LEP), alteration (ALT), or modification (Mod) to ensure AMD can confidently mature the technologies in time for insertion into a weapon system or production line.

AMD focuses on the development of both evolutionary and revolutionary technologies that the NNSA can apply to production processes throughout the nuclear security enterprise (NSE) and support multiple weapon systems. The AMD program is composed of the following three subprograms:

1. **Additive Manufacturing:**
   Capitalizes on three-dimensional printing of polymers and metals for stockpile applications that shorten production schedules and design cycles and may ultimately lead to lower life-cycle costs. It also allows the NSE better control over the manufacturing processes and reduces reliance on outside vendors. Applying additive manufacturing within the NSE should reduce cost and time for design-to-manufacture iterations, characterize additive manufacturing processes and capabilities, and develop methodologies that enable qualification and certification for weapons applications.
2. **Component Manufacturing Development (CMD):**
   Develops innovative manufacturing processes needed to replace sunset technologies, upgrade existing technologies, and introduce future technologies in support of maintaining the safety, security, and effectiveness of the nuclear weapons stockpile. CMD improves required manufacturing scientific and engineering capabilities while providing NNSA with cost-effective production processes that reduce risks for future weapon systems. This subprogram is responsible for developing manufacturing process proof of concepts and validating that those processes meet component design requirements with initial prototype builds. CMD coordinates with other programs to ensure proper transition of the technology.
3. **Process Technology Development:**
   Develops, demonstrates, and applies new production technologies to reduce costs and improve manufacturing processes for nuclear weapon materials. This subprogram ensures dedicated funding for new technologies with the potential to shorten production schedules, reduce risks, or enhance personnel safety, and enabling maturation without competing with other programmatic priorities. Presently, the subprogram is focused on uranium processing technology, including the development and acquisition of major equipment items for the Y-12 National Security Complex (Y-12).

Highlights of the FY 2018 Budget Request

- Leverage the adaptability of additive manufacturing, for broader implementation in the future stockpile.

- Achieve a better understanding of the process control and material performance of additively manufactured components in order to certify and qualify parts for high-consequence missions. The aim is to provide near-term benefits to the weapons complex, with further expansion in stockpile applications as our knowledge of and confidence in the technology improves.
- Develop new and/or improve materials, manufacturing processes, and enhance critical material properties that affect processing, performance, lifetime (aging), and safety of the nuclear weapons stockpile. The goal is to maximize the development and use of modern technologies to produce components faster and less expensively that meet or exceed design performance requirements. Concurrent with innovative production technologies comes the need for better data storage and retrieval, as well as the ability to ensure materials and equipment are free from defects and are not counterfeits.
- Fund three major items of equipment (MIE): calciner, electro-refiner, and machine chip processing furnace(s). These efforts support ceasing enriched uranium programmatic operations in Building 9212 at CNS Y-12 by 2025.

FY 2016 Accomplishments

- Kansas City National Security Campus (KCNSC) printed its 25,000th developmental tool project, fixture, and mold in 2016 in support of LEPs resulting in a cumulative cost avoidance of $45M as part the "Digital Manufacturing" initiative, targeted at driving radical improvements to mission success.
- CNS Pantex Plant received a Defense Programs Award of Excellence for using additive manufacturing to rapidly iterate design-to-production cycles for tools and fixtures that significantly reduced cost and time associated with work sent to outside vendors.
- Using AMD, Sandia National Laboratories (SNL) increased their neutron generator tooling output 25% at less than half the cost and time compared to traditional manufacturing methods.
- Completed three design iterations for a B61-12 LEP support and alignment fixture using topology optimization and additive manufacturing enabling them to meet B61-12 LEP requirements while avoiding costs and downtimes associated with sourcing the fixtures to outside vendors.
- Developed and initially employed the Electronic Production Control System (EPCS) that tracks parts through SNL's Silicon Fabrication (SiFab) facility, collects all the electronic data generated, and incorporates many defect prevention strategies. This automated quality control tool should result in significant savings for part production in support of multiple weapon systems.
- Completed development and testing of technologies associated with the Joint Radar Module (JRM) for the B61 and the W88; system requirement tests in FY 2016 resulted in no failures, enabling the transition of the JRM technology.
- Initiated tritium exposure and aging studies to determine if aluminum is a viable alternative material for reservoirs in future weapon systems. Using aluminum as the material of choice has the potential to decrease the mass in comparison to current reservoir systems as well as eliminate issues with current materials.
- Achieved Technology Readiness Level (TRL) 6 on the electro-refiner MIE and successfully advanced the calciner and electro-refiner projects towards Critical Decision 2/3. When deployed, these technologies will help modernize uranium processing activities.

Advanced Manufacturing Development
Funding

	(Dollars in Thousands)			
	FY 2016 Enacted	**FY 2017 Annualized CR***	**FY 2018 Request**	**FY 2018 vs FY 2016**
Research, Development, Test and Evaluation				
Advanced Manufacturing Development				
Additive Manufacturing	12,600	12,600	12,000	-600
Component Manufacturing Development	99,656	46,583	38,644	-61,012
Process Technology Development	17,800	28,522	29,896	+12,096
Total, Advanced Manufacturing Development	**130,056**	**87,705**	**80,540**	**-49,516**

* The FY 2017 Annualized CR amounts reflect the P.L. 114-254 continuing resolution level annualized to a full year. These amounts are shown only at the congressional control level and above, below that level, a dash (-) is shown

Advanced Manufacturing Development
Explanation of Major Changes
(Dollars in Thousands)

Advanced Manufacturing Development	FY 2018 vs FY 2016
Additive Manufacturing: The decrease represents realignment from technology development investments to address higher NNSA priorities, such as deferred maintenance and the secure transportation asset.	-600
Component Manufacturing Development: This decrease reflects a realignment from technology development investments to address higher NNSA priorities, such as deferred maintenance, the secure transportation asset and application specific development of integrated surety architectures. The remaining investment will focus on development of processes to address future manufacturing needs, improve process monitoring and control diagnostics, and address new approaches to better conserve scarce materials.	-61,012
Process Technology Development: The increase reflects finalized cost estimate for machine chip processing furnaces and increased electro-refining scope based on updated requirements.	+12,096
Total, Advanced Manufacturing Development	**-49,516**

Advanced Manufacturing Development
Additive Manufacturing

Description

The Additive Manufacturing subprogram leverages the adaptability of additive manufacturing, for broader implementation in the future stockpile. The focus is to fund activities that have the greatest likelihood to improve the reliability and effectiveness of the enduring stockpile; improve infrastructure responsiveness; and attract, train, and retain expert workforce through implementation of 21st century manufacturing technology.

Additive manufacturing is a revolutionary approach designed to capitalize on three-dimensional printing of polymers and metals for stockpile applications that can shorten production schedules and design cycles that may ultimately lead to lower life-cycle costs. Additive manufacturing can benefit the stockpile by reducing risk to program schedule and improving cost performance. It is a production tool that can support modeling, subcritical experiments, Joint Test Assemblies (JTAs), tooling, and stockpile components used in LEPs.

The Additive Manufacturing subprogram mission scope addresses the following four focus areas:

1. **Initial Capabilities.** Establish advanced and exploratory additive manufacturing capabilities.

2. **Prototype Production.** Produce additive manufacturing prototypes that demonstrate the range of their benefits.

3. **Science-based Manufacturing.** Develop methods that meet design and qualification requirements.

4. **Accelerated Qualification and Certification.** Accelerate qualification and certification thus reducing time between product design and production of critical components.

When deploying any new technology, ensuring that it is sufficiently safe and reliable for stockpile applications is a major challenge. By making measured investments and leveraging existing programmatic work, NNSA can realize the near-term benefits of additive manufacturing, while assessing its feasibility of making long-term investments for more challenging applications.

Additive Manufacturing

Activities and Explanation of Changes

FY 2016 Enacted	FY 2018 Request	Explanation of Changes FY 2018 vs FY 2016
Additive Manufacturing $12,600,000	**Additive Manufacturing $12,000,000**	**Additive Manufacturing -$600,000**
• Continue developing manufacturing processes, prototypes, and first production units for stockpile applications for: ▪ Critical Tooling ▪ Pads and Cushions ▪ Other assemblies ▪ Simple metal parts • Improve understanding of the science behind additive manufacturing through material testing and process modeling.	• Continue developing manufacturing processes, prototypes, and first production units for stockpile application. • Further improve understanding of the science behind additive manufacturing through material performance and process controls.	• The decrease reflects a realignment from technology development investments to address higher NNSA priorities, such as deferred maintenance and the secure transportation asset.

Advanced Manufacturing Development
Component Manufacturing Development

Description

The Component Manufacturing Development (CMD) subprogram develops innovative manufacturing processes needed to replace sunset technologies, upgrade existing technologies, and introduce future technologies in support of maintaining the safety, security, and effectiveness of the nuclear weapons stockpile. This entails improving required manufacturing, scientific and engineering capabilities, and providing NNSA with cost-effective production processes that reduce risks for future weapon systems. This subprogram is responsible for developing manufacturing process proof of concepts and validating those processes meet component design requirements with initial prototype builds. CMD coordinates with other programs to ensure proper transition of the technology.

The CMD subprogram mission scope has four focus areas:

1. **Advanced Production Development.** Draws on exploratory manufacturing research at the national laboratories and production plants to inform decision on process improvements. This is intended to improve current capabilities through the development of manufacturing new materials and production processes.

2. **Manufacturing Process Integration.** Facilitates introduction of new manufacturing techniques into production lines. It ensures that materials and components produced by novel manufacturing processes meet design requirements and are on a well-defined path to insert into a weapon system or production line.

3. **Manufacturing Diagnostic Development**. Enables new manufacturing processes by developing process monitoring and control diagnostics required to observe and study novel production methods and materials. These diagnostics provide a path to qualification and certification for manufacturing processes and assure the integrity of the nuclear weapon supply chain.

4. **Material Obsolescence and Sunset Processes.** Pursues alternatives for replacing obsolete or hazardous materials and aging production processes, and includes new approaches designed to better conserve materials that are scarcely available or challenging to produce. It is critical to develop new techniques or materials before aging issues or material shortages affect the success of LEPs, ALTs, or Mods.

Component Manufacturing Development

Activities and Explanation of Changes

FY 2016 Enacted	FY 2018 Request	Explanation of Changes FY 2018 vs FY 2016
Component Manufacturing Development $99,656,000	**Component Manufacturing Development $38,644,000**	**Component Manufacturing Development -$61,012,000**
• Continue KCNSC development of electrical component assemblies for the radar. • Continue KCNSC upgrades to major component assemblies associated with arming and fuzing functions. • Continue KCNSC development of production machining and assembly for gas transfer systems (GTS). • Continue KCNSC advanced material development of Direct Ink Write technology. • Initiate KCNSC process development or work associated with advanced firing set, manufacturing inspection and test, mechanism development, microelectronic development, initiation system readiness, data management, optical switch, and trusted and secure manufacturing. • Initiate Lawrence Livermore National Laboratory (LLNL) advanced manufacturing work in support of reuse, refurbishment, and/or replacement of pit components. • Continue LLNL and Los Alamos National Laboratory (LANL) developmental insensitive high explosives (IHE) production (e.g., TATB and PBX 9502) and qualification activities. • Initiate Pantex Plant work associated with the nuclear explosion package such as radiography, extrudables, explosive loading process, load charge housing, test fire processes, pit reuse workstation, PBX 9502 vendor qualification,	• Continue KCNSC development work scope associated with advanced additive manufacturing, development of advanced materials, digital and computational manufacturing, and implementing new trusted and secure manufacturing techniques. • Continue LLNL additive manufacturing work on specific applications to produce components faster and less expensively while still meeting design performance requirements. • Complete Pantex work associated with a new optical assembly. • Continue SNL advanced materials development related to thermal batteries. • Continue to develop the capability to detect counterfeit components. • Continue SRNL limited life component work regarding advanced materials development and aluminum reservoirs. • Complete Y-12 evaluation and implementation of additive manufacturing methods in unexplored tooling and engineering applications.	• This decrease reflects a realignment from technology development investments to address higher NNSA priorities, such as deferred maintenance, the secure transportation asset, and application specific development of integrated surety architectures. The remaining investment will focus on development of processes to address future manufacturing needs, improve process monitoring and control diagnostics, and address new approaches to better conserve scarce materials.

FY 2016 Enacted	FY 2018 Request	Explanation of Changes FY 2018 vs FY 2016
Integrated Pump-Down and Fill Station (IPFS), and annealed pit tubes. • Continue SNL limited life component work regarding advanced materials development and aluminum vessels for tritium service. • Continue SNL neutron generator tester development. • Continue SNL upgrades to gas transfer systems neutron generator subsystems. • Continue SNL heterojunction bipolar transistor (HBT) process development. • Continue Savannah River Nuclear Solutions (SRNS) limited life component work regarding advanced materials development and aluminum vessels for tritium service. • Continue SRNL development of reservoir filling and testing processes for new GTS designs. • Initiate Y-12 diagnostic capabilities and upgrades related to digital radiography, dimensional inspections, and metal component certification. • Initiate Y-12 ability to certify diagnostic equipment and upgrade manufacturing capabilities. • Continue technical design, development, qualification, and production of new GTS test valves coordinated among LANL, KCNSC, SNL, and SRNS. • Continue advanced initiation systems manufacturability studies at LANL and KCNSC. • Support studies to expand the application of additive manufacturing throughout the nuclear security enterprise. • Support procurement and installation of a 5-Axis Machining Center, a milling machine tool for metal (MIE).		

Advanced Manufacturing Development
Process Technology Development

Description

The Process Technology Development subprogram supports the development, demonstration, and utilization of new production technologies to reduce costs and enhance nuclear manufacturing capabilities for nuclear weapon materials. Process Technology Development ensures new technologies with the potential to shorten production schedules, reduce risks, or enhance personnel safety by having a dedicated funding source to reach optimal levels of maturity without competing with other programmatic priorities. Presently, the subprogram is focused on uranium processing technology, including the development and acquisition of major items of equipment (MIE) for Y-12.

The purpose of this subprogram is to develop and implement new technology, primarily through MIE in support of ceasing enriched uranium programmatic operations in Building 9212 at Y-12 by 2025. The MIE include a calciner, electro-refiner, and machine chip processing furnace(s). The latter is planned for installation of one furnace by the end of FY 2018.

Additional work related to the Uranium Strategy and ceasing enriched uranium programmatic operations in Building 9212 by 2025 is described in Uranium Sustainment within Strategic Materials, under Directed Stockpile Work.

Process Technology Development

Activities and Explanation of Changes

FY 2016 Enacted	FY 2018 Request	Explanation of Changes FY 2018 vs FY 2017
Process Technology Development $17,800,000	**Process Technology Development $29,896,000**	**Process Technology Development +$12,096,000**
• Continue to support three MIE: ▪ Calciner – a rotary drum calciner will stop the practice of recovering low-equity enriched uranium (EU) materials by segregating salvage and accountability functions so they no longer go through purification. ▪ Electro-refiner – an electrically-based chemical purification system to provide a replacement capability for current aqueous-based process. ▪ Machine Chip Processing Furnace(s) – install chip melt furnace(s) for recovery of EU machine tool turnings for subsequent reuse in manufacturing processes.	• Continue to support three MIE and associated technology development efforts and refine the scope for the direct electrolytic reduction MIE: ▪ Calciner – a rotary drum calciner will stop the practice of recovering low equity EU materials by segregating salvage and accountability functions so they no longer go through purification. ▪ Electro-refiner – an electrically-based chemical purification system to provide a replacement capability for current aqueous-based process. ▪ Machine Chip Processing Furnace(s) – install chip melt furnace(s) for recovery of EU machine tool turnings for subsequent reuse in manufacturing processes.	• This increase will support continued progress on calciner, fund additional electro-refiner scope to meet updated requirements, and the installation of the first machine chip processing furnace. • In FY 2016, there was a rebalancing of resources between Uranium Sustainment and Process Technology Development within the Advanced Manufacturing Program to more efficiently execute the enriched uranium strategy. This directly supports ceasing enriched uranium programmatic operations in Building 9212 by 2025. • Direct electrolytic reduction cell deferred until 2021-2022 to balance additional costs.

Advanced Manufacturing Development
Performance Measures

In accordance with the GPRA Modernization Act of 2010, the Department sets targets for, and tracks progress toward, achieving performance goals for each program.

	FY 2016	FY 2017	FY 2018
Performance Goal (Measure)	**Component Manufacturing Development -** The annual progress towards the maturation of production technologies and manufacturing capabilities as measured by the number of deliverables completed.		
Target	5 deliverables	6 deliverables	5 deliverables
Result	Met - 5	TBD	TBD
Endpoint Target	Until the last nuclear weapon system in the stockpile is dismantled, NNSA will continue to mature production technologies and manufacturing capabilities to support Directed Stockpile Work, nuclear weapons refurbishment, and assessment activities.		

Advanced Manufacturing Development
Capital Summary

(Dollars in Thousands)

	Total	Prior Years	FY 2016 Enacted	FY 2016 Current	FY 2017 Annualized CR	FY 2018 Request	FY 2018 vs FY 2016	Outyears to Completion
Capital Operating Expenses Summary (including Major Items of Equipment (MIE)								
Capital Equipment >$500K (including MIE)	N/A	N/A	44,646	44,646	55,805	58,927	+14,281	N/A
Plant Projects (GPP and IGPP)	N/A	N/A	0	0	0	0	0	N/A
Total, Capital Operating Expenses	**N/A**	**N/A**	**44,646**	**44,646**	**55,805**	**58,927**	**+14,281**	**N/A**
Capital Equipment > $500K (including MIE)								
Total Non-MIE Capital Equipment	N/A	N/A	27,206	27,206	27,805	28,417	+1,211	N/A
Calciner, Y-12	45,800	9,200	7,100	7,100	3,500	7,750	+650	18,250
Machine Chip Processing Furnace 1, Y-12	9,750	0	740	740	4,500	4,510	+3,770	0
Machine Chip Processing Furnace 2, Y-12	9,750	0	0	0	0	0	0	9,750
Machine Chip Processing Furnace 3, Y-12	9,750	0	0	0	0	0	0	9,750
Machine Chip Processing Furnace 4, Y-12	9,750	0	0	0	0	0	0	9,750
Electrofiners, Y-12	80,950	6,731	9,600	9,600	20,000	18,250	+8,650	26,369
Direct Electrolytic Reduction, Y-12	45,250	0	0	0	0	0	0	45,250
Total, Capital Equipment (including MIE)	**N/A**	**N/A**	**44,646**	**44,646**	**55,805**	**58,927**	**+14,281**	**N/A**
Plant Projects (GPP and IGPP)								
Total Plant Projects (GPP/IGPP) (Total Estimated Cost (TEC) <$5M)	N/A	N/A	0	0	0	0	0	N/A
Total, Plant Projects (GPP/IGPP)	**N/A**	**N/A**	**0**	**0**	**0**	**0**	**0**	N/A
Total, Capital Summary	**N/A**	**N/A**	**44,646**	**44,646**	**55,805**	**58,927**	**+14,281**	**N/A**

Infrastructure and Operations

Overview

The Infrastructure and Operations program maintains, operates, and modernizes the National Nuclear Security Administration (NNSA) infrastructure in a safe, secure, and cost-effective manner to support program results. Infrastructure and Operations efforts provide a comprehensive approach to arresting the declining state of NNSA infrastructure while maximizing return on investment, enabling program results, and reducing enterprise risk. The program also plans, prioritizes, and constructs state-of-the-art facilities, infrastructure, and scientific tools.

Operations of Facilities

The Operations of Facilities program provides the funding required to operate NNSA facilities in a safe and secure manner and is fundamental to achieving NNSA's plutonium, uranium, tritium, lithium, high explosives, and other mission objectives. This program includes essential support such as water and electrical utilities; safety systems; lease agreements; and activities associated with Federal, state, and local environmental, worker safety, and health regulations.

Safety and Environmental Operations

The Safety and Environmental Operations program provides for the Department's Nuclear Criticality Safety Program (NCSP), Nuclear Safety Research and Development (NSR&D), Packaging subprogram, and Long Term Stewardship (LTS) subprogram. These activities support safe, efficient operation of the nuclear security enterprise through the provision of safety data, environmental monitoring, and nuclear material packaging.

Maintenance and Repair of Facilities

The Maintenance and Repair of Facilities program (Maintenance) provides direct-funded maintenance activities across the NNSA enterprise for the recurring day-to-day work required to sustain and preserve NNSA facilities and equipment in a condition suitable for their designated purpose. These efforts include predictive, preventive, and corrective maintenance activities to maintain facilities, property, assets, systems, roads, equipment, and vital safety systems.

Recapitalization

The Recapitalization program, comprised of the Infrastructure and Safety subprogram and the Capability Based Investments subprogram, is key to arresting the declining state of NNSA's infrastructure. A sustained investment in Recapitalization is needed to address numerous obsolete support and safety systems; revitalize facilities that are beyond the end of their design life; and improve the reliability, efficiency, and capability of core infrastructure to meet mission requirements. The Recapitalization program modernizes NNSA infrastructure by prioritizing investments to improve the condition and extend the life of structures, capabilities, and systems thereby improving the safety and quality of the workplace. Recapitalization investments help achieve operational efficiencies and reduce safety, security, environmental, and program risk.

The Recapitalization program includes minor construction projects, capital equipment, Other Project Costs (OPC) for Infrastructure and Operations funded line item construction projects (excluding CMRR, UPF, U1a Complex Enhancements Project and Advanced Simulation and Computing), and disposal of excess infrastructure.

Line Item Construction

Infrastructure and Operations line item construction projects are critical to revitalizing both general purpose infrastructure and program-specific capabilities directly supporting the nuclear weapons and nonproliferation programs. These projects will replace obsolete, unreliable facilities and infrastructure to reduce safety and program risk while improving responsiveness, capacity, and capabilities.

Highlights of the FY 2018 Budget Request

The FY 2018 Infrastructure and Operations Budget Request totals $2,803,137,000, which represents the continuation of a long-term effort to arrest the declining state of NNSA infrastructure. This Request includes increases to Maintenance and Repair of Facilities and Recapitalization to continue the stabilization of deferred maintenance and improve the condition of NNSA infrastructure. The increase in funding also supports UPF and CMRR per the respective project execution plans and efforts to cease programmatic operations in the existing aged facilities. Increased funding also provides for general purpose and programmatic construction projects including: the construction of the Albuquerque Complex Project to replace the current aging and degrading federal facilities in Albuquerque; construction of the Emergency Operations Center at Y-12; design and construction of a Fire Station at Y-12; Expand Electric Distribution System at LLNL to expand and supplement electrical distribution at the site; construction of the U1a Complex Enhancements project at the NNSS; the Radioactive Liquid Waste Treatment Facility (RLWTF) and Transuranic Liquid Waste Facility (TLW) projects at LANL; and design for the Tritium Production Capability at SRS.

Major Priorities and Assumptions

In response to GAO recommendations, the following information is provided to improve transparency in the budget. Table 1 below lists total deferred maintenance (DM) at NNSA sites as well as the subset of DM on excess facilities and facilities to be excessed in 10 years.

Table 1

NNSA Deferred Maintenance (DM) as of FY 2016 (dollars in thousands)	
Total DM	2,510,803
DM on excess facilities	39,905
DM on facilities to be excessed in 10 years	322,752

Approximately 13 percent of NNSA DM is associated with facilities that are or will be excess in the next 10 years. As part of a prudent investment strategy, NNSA will intentionally not perform some of the maintenance and repair on facilities that are or soon will become excess. In addition, NNSA will eliminate DM on excess facilities via disposition.

NNSA annually screens excess facilities to identify the highest risks to mission, workers, the public, and the environment to support risk-informed decision making. Table 2 lists the highest-risk facilities.

Table 2

NNSA's Top Ten High-Risk Excess Facilities			
Site	**Facility**	**Year Built**	**Year Shut Down**
Y-12	Alpha 5, Building 9201-05	1944	1983
Y-12	Beta 4, Building 9204-04	1945	2007
Y-12	Building 9206	1944	1993
LLNL	Heavy Elements Facility, Building 251	1956	1995
LLNL	Livermore Pool-Type Reactor, Building 280	1956	1980
LLNL	MARS-E Beam, Building 175	1980	1999
LLNL	Rotating Target Neutron Source Facility, Building 292	1979	1987
LANL	Ion Beam Facility, Building TA-3-0016	1953	1999
LANL	HE Pressing Complex, Building TA-16-0430	1953	2007
LLNL	Pluto Project Testing and Fabrication Facility, Building 241	1960	2008

Infrastructure and Operations
Funding

	(Dollars in Thousands)			
	FY 2016 Enacted	**FY 2017 Annualized CR***	**FY 2018 Request**	**FY 2018 vs FY 2016**
Infrastructure and Operations				
Operating				
Operations of Facilities			868,000	+868,000
Kansas City National Security Campus	100,250	100,250		-100,250
Lawrence Livermore National Laboratory	70,671	70,671		-70,671
Los Alamos National Laboratory	196,460	196,460		-196,460
Nevada National Security Site	89,000	89,000		-89,000
Pantex	58,021	55,000		-58,021
Sandia National Laboratories	115,300	115,300		-115,300
Savannah River Site	80,463	80,463		-80,463
Y-12 National Security Complex	120,625	107,000		-120,625
Total, Operations of Facilities	**830,790**	**814,144**	**868,000**	**+37,210**
Safety and Environmental Operations	107,701	110,000	116,000	+8,299
Maintenance and Repair of Facilities	277,000	294,000	360,000	+83,000
Recapitalization				
Infrastructure and Safety	253,724	289,488	312,492	+58,768
Capability Based Investments	98,800	98,800	114,850	+16,050
Subtotal, Recapitalization	**352,524**	**388,288**	**427,342**	**+74,818**
Total, Operating	**1,568,015**	**1,606,432**	**1,771,342**	**+203,327**
Construction	711,109	801,785	1,031,795	+320,686
Total, Infrastructure and Operations	**2,279,124**	**2,408,217**	**2,803,137**	**+524,013**

* The FY 2017 Annualized CR amounts reflect the P.L. 114-254 continuing resolution level annualized to a full year. These amounts are shown only at the congressional control level and above, below that level, a dash (-) is shown.

Infrastructure and Operations
Explanation of Major Changes
(Dollars in Thousands)

	FY 2018 vs FY 2016
Infrastructure and Operations	
Operations of Facilities: The overall increase reflects characterization of transuranic waste in preparation for shipment to the Waste Isolation Pilot Plant (WIPP) under revised Waste Acceptance Criteria at LLNL; the transition to operations of new waste facilities at LANL; and rising reimbursement requirements for Savannah River Nuclear Solutions pension plans at SRS. These increases were partially offset by reductions resulting from the transfer of the Bannister Federal Complex to a private developer for redevelopment in FY 2017 at KC NSC and the transfer of scope at Y-12 to the Long Term Stewardship program within Safety and Environmental Operations, as well as anticipated efficiencies gained via increased investments in Maintenance and Repair of Facilities and Recapitalization. There were no significant changes at NNSS, Pantex, and SNL.	**+37,210**
Safety and Environmental Operations: The increase reflects the transfer of scope from Y-12 Operations of Facilities for five facilities that treat waste streams normally associated with the Long Term Stewardship program. The increase also provides additional funding for nuclear criticality safety training and experiments.	**+8,299**
Maintenance and Repair of Facilities: The increase provides additional funding to continue the stabilization of deferred maintenance, improve the working condition of NNSA facilities and equipment, expand the Roof Asset Management Program, and fully implement the Cooling and Heating Asset Management Program.	**+83,000**
Recapitalization:	
• **Infrastructure and Safety:** The increase reflects investments for upgrading aging infrastructure to address safety and programmatic risks, improve productivity, and lower operating costs.	**+58,768**
• **Capability Based Investments (CBI)**: The increase is due to two factors: 1) planning and design for CBI projects moved from Strategic Materials Sustainment, and 2) increased funding for capabilities supporting weapons life extension programs (LEPs) and major alterations.	**+16,050**
Construction: The increase primarily reflects funding for construction of the UPF; CMRR project; Albuquerque Complex Project; Expansion of the Electrical Distribution System at LLNL; U1a Complex Enhancements Project; and new starts for the Y-12 Fire Station and Tritium Production Capability at SRS.	**+320,686**
Total, Infrastructure and Operations	**+524,013**

Infrastructure and Operations
Operations of Facilities

Description

The Operations of Facilities program provides the funding required to operate NNSA facilities in a safe manner. Operations of Facilities is fundamental to achieving NNSA's plutonium, uranium, tritium, lithium, high explosives, and other mission objectives. It includes essential support such as water and electrical utilities, safety systems, lease agreements for facilities and land, emergency response services, and other critical systems. This program also provides resources for environment, safety, health, and quality (ESH&Q) costs associated with ensuring compliance with Federal; state; and local environmental, worker safety, and health regulations as well as applicable DOE Orders and Directives.

The Operations of Facilities program also funds waste management activities, including treatment, storage, and waste disposition of both hazardous and newly generated radiological wastes. It provides for the daily operations and staffing to ensure facilities, systems, equipment, and capabilities are available to meet mission requirements. FY 2016-FY 2018 site allocations for the Operations of Facilities program are provided in Table 3 below.

Table 3

National Nuclear Security Administration Operations of Facilities Allocations by Site (Dollars in Thousands)			
Site	**FY 2016**	**FY 2017**	**FY 2018**
Kansas City National Security Campus	100,250	101,000	90,000
Lawrence Livermore National Laboratory	70,671	70,500	92,000
Los Alamos National Laboratory	196,460	196,500	207,000
Nevada National Security Site	89,000	92,500	93,000
Pantex Plant	58,021	55,000	59,000
Sandia National Laboratories	115,300	118,000	118,000
Savannah River Site	80,463	83,500	105,000
Y-12 National Security Complex	120,625	107,000	104,000
TOTAL	**830,790**	**824,000**	**868,000**

Operations of Facilities

Activities and Explanation of Changes

FY 2016 Enacted	FY 2018 Request	Explanation of Changes FY 2018 vs FY 2016
Operations of Facilities $830,790,000	**Operations of Facilities $868,000,000**	**Operations of Facilities +$37,210,000**
• Funding was appropriated by site in FY 2016.	• Funding supports base facility operations at: o KC in support of non-nuclear production. o LLNL to support plutonium, tritium and high explosive nuclear security enterprise missions. Includes funds to certify TRU waste in preparation for shipment to WIPP. o LANL in support of plutonium production, research, and development; chemistry and metallurgy research; weapons engineering and tritium capability; and beryllium operations. o NNSS, including experimental capabilities. o Pantex, including industrial and high explosives to support weapon assembly, disassembly, and surveillance in support of the LEPs. o SNL, including environmental testing and microelectronics technologies facilities. o SRS, including tritium capabilities. o Y-12 for enriched and depleted uranium, lithium, and other special material operations.	• The overall increase reflects characterization of transuranic waste in preparation for shipment to the Waste Isolation Pilot Plant (WIPP) under revised Waste Acceptance Criteria at LLNL; the transition to operations of new waste facilities at LANL; and rising reimbursement requirements for Savannah River Nuclear Solutions pension plans at SRS. These increases were partially offset by reductions resulting from the transfer of the Bannister Federal Complex to a private developer for redevelopment in FY 2017 at KC NSC and the transfer of scope to the Long Term Stewardship program within Safety and Environmental Operations, as well as anticipated efficiencies gained via increased investments in Maintenance and Repair of Facilities and Recapitalization. There were no significant changes at NNSS, Pantex, and SNL.
Kansas City National Security Campus $100,250,000	**Kansas City National Security Campus $0**	**Kansas City National Security Campus -$100,250,000**
• Funding supported base facility operations in support of non-nuclear production. This included facility operations, utilities, steam, gas and electric distribution, leases, program management, waste management, ES&H, and industrial safety.	• Funding is requested at the Operations of Facilities control level.	• Funding is requested at the Operations of Facilities control level.
Lawrence Livermore National Laboratory $70,671,000	**Lawrence Livermore National Laboratory $0**	**Lawrence Livermore National Laboratory -$70,671,000**
• Funding provided for base operations to support nuclear security enterprise missions. This included providing for facility and infrastructure operations,	• Funding is requested at the Operations of Facilities control level.	• Funding is requested at the Operations of Facilities control level.

FY 2016 Enacted	FY 2018 Request	Explanation of Changes FY 2018 vs FY 2016
which support plutonium, tritium, and high explosives activities; environmental tests; and regulated site-wide comprehensive waste management. It also funded waste management facilities and activities including treatment, and offsite disposal of TRU waste.		
Los Alamos National Laboratory $196,460,000	**Los Alamos National Laboratory $0**	**Los Alamos National Laboratory -$196,460,000**
• Funding provided for base operations in support of plutonium production, research, and development; chemistry and metallurgy research; weapons engineering and tritium capability; and beryllium operations. Also, funded solid waste risk reduction activities (including ceasing low level and low-level mixed waste (LLW/LLMW) operations at Area G, and continued processing of stored new generation TRU waste at Area G). • Fully funded the Los Alamos Pueblo Project.	• Funding is requested at the Operations of Facilities control level.	• Funding is requested at the Operations of Facilities control level.
Nevada National Security Site $89,000,000	**Nevada National Security Site $0**	**Nevada National Security Site -$89,000,000**
• Funding provided for base operations including facility operations, utilities, steam, gas and electric distribution, leases, program management, and waste management. It also supported ES&H, which includes radiation, industrial, and high explosives safety in support of Security Category I/II SNM handling and staging; the LEPs; the Nuclear Counterterrorism program; DOE's NCSP; and legacy environmental cleanup commitments.	• Funding is requested at the Operations of Facilities control level.	• Funding is requested at the Operations of Facilities control level.

FY 2016 Enacted	FY 2018 Request	Explanation of Changes FY 2018 vs FY 2016
Pantex Plant $58,021,000	**Pantex Plant $0**	**Pantex Plant -$58,021,000**
• Funding provided for base operation costs, including facility operations, utilities, steam, gas and electric distribution, leases, program management, and waste management. It also supported ES&H, which includes radiation, industrial, and high explosives safety to support weapon assembly, disassembly, and surveillance in support of the LEPs; high explosives synthesis, formulation, and machining in support of production; and Special Nuclear Material non-destructive evaluation and requalification. Also funded payment in lieu of taxes.	• Funding is requested at the Operations of Facilities control level.	• Funding is requested at the Operations of Facilities control level.
Sandia National Laboratories $115,300,000	**Sandia National Laboratories $0**	**Sandia National Laboratories -$115,300,000**
• Funding provided for major infrastructure capabilities, including environmental test facilities for various environments such as electromechanical, abnormal, and normal; Microelectronics Development Laboratory; Tech Area IV Accelerators; Tech Area V Nuclear Reactor facilities; Electromagnetic Test Facilities; Primary Standards Laboratory (PSL); Materials Characterization Laboratories; and Tonopah Test Range in Nevada.	• Funding is requested at the Operations of Facilities control level.	• Funding is requested at the Operations of Facilities control level.
Savannah River Site $80,463,000	**Savannah River Site $0**	**Savannah River Site -$80,463,000**
• Funding provided for base operations, including facility operations, utilities, steam, gas and electric distribution, leases, program management, and waste management. It also supported ES&H, which includes radiation and industrial safety, in support of production, reclamation of gas transfer systems for limited life component exchange and LEPs; loading and unloading, recycling, and recovery of tritium and	• Funding is requested at the Operations of Facilities control level.	• Funding is requested at the Operations of Facilities control level.

FY 2016 Enacted	FY 2018 Request	Explanation of Changes FY 2018 vs FY 2016
deuterium gases; and surveillance of Gas Transfer Systems (GTS).		
Y-12 National Security Complex $120,625,000	**Y-12 National Security Complex $0**	**Y-12 National Security Complex -$120,625,000**
• Funding provided for base operations, including facility operations, utilities, steam, gas and electric distribution, leases, program management, and waste management. It also supported ES&H, which includes radiation and industrial safety, in support of the Y-12 complex including: enriched and depleted uranium operations; lithium and other special material operations; component production and fabrication; HEU down-blending activities; and weapon assembly and disassembly in support of LEPs. Also funds payment in lieu of taxes.	• Funding is requested at the Operations of Facilities control level.	• Funding is requested at the Operations of Facilities control level.

Description

The Safety and Environmental Operations program provides for the Department's Nuclear Criticality Safety Program (NCSP), the Nuclear Safety Research and Development (NSR&D) subprogram, the Packaging subprogram, and the Long Term Stewardship (LTS) subprogram. Table 4 provides the funding breakout for these subprograms.

The Nuclear Criticality Safety Program (NCSP) develops, maintains and disseminates the essential technical tools, training and data required to support safe, efficient fissionable material operations within DOE. This includes maintaining and operating the National Criticality Experiments Research Center (NCERC) at the Nevada National Security Site where critical and sub-critical experiments are conducted to provide tests of nuclear data, analytical codes and to develop new measurement methods.

The Nuclear Safety Research and Development (NSR&D) subprogram provides the technical foundation for safety analyses and controls as well as authorization basis decision making for DOE/NNSA nuclear facilities and associated operations. The NCSP and NSR&D subprograms are vital to ensuring nuclear safety is achieved across the NNSA enterprise.

The Packaging subprogram ensures safe transport of nuclear and radiological materials by providing off-site shipping container research and development, design, certification, recertification, test and evaluation, production and procurement, fielding and maintenance, decontamination and disposal. It also provides off-site transportation authorization of shipping containers for nuclear materials and components supporting both the nuclear weapons program and nuclear nonproliferation and other mission objectives.

The Long Term Stewardship (LTS) subprogram ensures environmental safety by conducting activities necessary to meet Federal and state environmental regulatory requirements identified in legally enforceable site permits, cleanup agreements, and legislation to ensure safe cleanup levels. For example, the LTS subprogram operates and maintains remediation systems and monitoring contaminant levels in the soil and groundwater. LTS is required to meet environmental compliance associated with the ongoing operations of a site that has a Resource Conservation and Recovery Act (RCRA) Part B Operating Permit and/or is subject to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).

Table 4

National Nuclear Security Administration Safety and Environmental Operations Subprograms (Dollars in Thousands)			
Subprogram	**FY 2016**	**FY 2017**	**FY 2018**
Nuclear Criticality Safety Program	23,785	27,298	27,623
Nuclear Safety Research and Development	4,000	3,837	3,838
Packaging	27,701	28,804	28,690
Long Term Stewardship	52,215	50,061	55,849
TOTAL	**107,701**	**110,000**	**116,000**

Safety and Environmental Operations

Activities and Explanation of Changes

FY 2016 Enacted	FY 2018 Request	Explanation of Changes FY 2018 vs FY 2016
Safety and Environmental Operations $107,701,000	**Safety and Environmental Operations $116,000,000**	**Safety and Environmental Operations +$8,299,000**
Nuclear Criticality Safety Program $23,785,000	**Nuclear Criticality Safety Program $27,623,000**	**Nuclear Criticality Safety Program +$3,838,000**
• Provided technical infrastructure, expertise and experimentation capabilities for the DOE encompassing the following technical elements: Nuclear Data, Analytical Methods, Training & Education, Information Preservation and Dissemination, and Integral Experiments that included the DOE Nuclear Criticality Safety Program's NCERC to ensure that criticality safety capabilities were adequate for the DOE mission.	• Provides technical infrastructure, expertise, and experimentation capabilities for the DOE encompassing the following technical elements: Nuclear Data, Analytical Methods, Training & Education, Information Preservation and Dissemination, and Integral Experiments. Integral Experiments includes the NCSP's NCERC to ensure criticality safety capabilities are adequate for the DOE mission.	• The increase provides additional funding for nuclear criticality safety training and experiments.
Nuclear Safety Research and Development $4,000,000	**Nuclear Safety Research and Development $3,838,000**	**Nuclear Safety Research and Development -$162,000**
• NSR&D activities provided the technical foundation for safety analyses and controls as well as authorization basis decision making for DOE/NNSA nuclear facilities and associated operations.	• Conducts projects to provide the technical foundation for safety analyses and controls as well as authorization basis decision making for DOE/NNSA nuclear facilities and associated operations.	• No significant changes.
Packaging $27,701,000	**Packaging $28,690,000**	**Packaging +$989,000**
• Completed final design and regulatory tests of Defense Programs Package (DPP)-1 and DPP-3. • Recertified container fleet every five years (or as necessary) to ensure containers still met regulations and requirements. • Continued to add new contents to existing container fleet. • Provided container refurbishment, reconditioning, and annual maintenance and certification to ensure containers were available for use to support weapons production, LEP, surveillance, and dismantlement activities.	• Refurbish, recondition, maintain, and certify containers to ensure availability to support the nuclear weapons mission.	• No significant changes.

FY 2016 Enacted	FY 2018 Request	Explanation of Changes FY 2018 vs FY 2016
Long Term Stewardship $52,215,000	**Long Term Stewardship $55,849,000**	**Long Term Stewardship +$3,634,000**
• Funded LTS activities at four NNSA sites to operate and maintain environmental remedial systems, perform monitoring and analysis of environmental media to ensure compliance with federal and state requirements, re-evaluated activities for consistency with regulatory revisions and technology, and worked with federal and state agencies and stakeholders in executing the LTS activities in a cost-effective, compliant, and safe manner. • KC met regulatory requirements by continuing to treat contaminated ground water, performing monitoring of surface and ground water, and complete the installation of a replacement water treatment system. It also provided for corrective action required in the KC Resource Conservation and Recovery Act (RCRA) permit for the Bannister Federal Complex, including a qualitative risk assessment, field work, and environmental assessment activities, analyses and reports. • LLNL Main Site and Site 300 met regulatory requirements by continuing to treat contaminated ground water; performing monitoring of ground water; operating and maintaining landfill remedies; Five Year Review of the General Services Area; implemented Institutional Controls agreement with offsite landowner; completed new injections wells for effluent reinjection at Site 300; and enhanced source area remediation tests at Main Site. • Pantex met regulatory requirements by continuing to treat contaminated ground water via pump and treat in-situ bioremediation	• Supports LTS regulatory required activities at the KC National Security Campus, LLNL (Main Site and Site 300), Pantex Plant, SNL, and Y-12 National Security Complex. • LTS required activities include: treating contaminated ground water; monitoring surface/ground water and soils; maintaining landfill remedies; performing CERCLA and RCRA 5-year remedy reviews of selected cleanup remedies; working with the Environmental Protection Agency regions and various states to meet post-completion regulatory cleanup and reporting requirements; and working in concert with other federal agencies, states, and affected stakeholders to execute LTS activities in a cost effective, compliant, and safe manner consistent with end states.	• The increase reflects the transfer of RCRA waste responsibilities from Operations of Facilities to LTS.

FY 2016 Enacted	FY 2018 Request	Explanation of Changes FY 2018 vs FY 2016
systems. It also supported performing monitoring of ground water and operations and maintenance of landfill remedies. • SNL met regulatory requirements by continuing to support environmental monitoring of surface water, ground water, and soil. It also provided for operating and maintaining landfill remedies.		

Infrastructure and Operations
Maintenance and Repair of Facilities

Description

The Maintenance and Repair of Facilities program provides direct-funded maintenance activities across the NNSA enterprise for the recurring day-to-day work required to sustain and preserve NNSA facilities and equipment in a condition suitable for their designated purpose. These efforts include predictive, preventive, and corrective maintenance activities to maintain facilities, property, assets, systems, roads, equipment, and vital safety systems. This program also funds maintenance of excess facilities (including high-risk excess facilities) necessary to minimize the risk posed by those facilities prior to disposition.

Maintenance and Repair of Facilities is prioritized within an enterprise risk management framework based on mission needs; probability of failure of a system or a component; and risk determination with regard to safety, security and environmental requirements. Investments focus on those structures, systems, and components that are considered essential to the national security mission. FY 2016-FY 2018 Infrastructure and Operations site allocations for direct-funded maintenance are provided in Table 5 below.

This program also funds the Roof Asset Management Program (RAMP) and the Cooling and Heating Asset Management Program (CHAMP). RAMP provides a dedicated approach to managing roofing assets through a single prioritized list of roofing needs across the nuclear security enterprise. The benefits of this approach enable the implementation of standard industry processes and best practices in the management of the roofing portfolio at a corporate level. Efficiencies are achieved by centralized procurement through leveraged buying power and long-term solutions instead of short-term repairs. The successful RAMP methodology has been expanded to other common components/systems under the Asset Management Program (AMP). NNSA implemented CHAMP pilots in FY 2016, with full implementation of the program in FY 2017. Other systems will be analyzed as possible AMPs to achieve additional efficiencies.

Table 5

National Nuclear Security Administration
Infrastructure and Operations Direct Funded Maintenance and Repair of Facilities Allocations by Site
(Dollars in Thousands)

Site	FY 2016	FY 2017	FY 2018
Kansas City National Security Campus	21,904	24,000	23,000
Lawrence Livermore National Laboratory	6,697	13,000	13,500
Los Alamos National Laboratory	49,068	60,000	62,000
Nevada National Security Site	20,000	25,000	25,000
Pantex Plant	48,055	59,000	63,500
Sandia National Laboratories	2,000	5,000	5,000
Savannah River Site	18,932	23,000	24,000
Y-12 National Security Complex	59,000	60,000	65,000
Enterprise Acquisitions*	51,344	55,000	79,000
TOTAL	**277,000**	**324,000**	**360,000**

* The Maintenance and Repair of Facilities allocation under "Enterprise Acquisitions" includes funding for Asset Management Programs, which achieve economies of scale and maintenance standardization for critical building systems that are common across the enterprise (e.g. roofs, HVAC) and to quickly respond to emergent unforeseeable issues. Funding is distributed to the sites during execution, which is consistent with industry best practices.

Maintenance and Repair of Facilities

Activities and Explanation of Changes

FY 2016 Enacted	FY 2018 Request	Explanation of Changes FY 2018 vs FY 2016
Maintenance and Repair of Facilities $277,000,000	**Maintenance and Repair of Facilities $360,000,000**	**Maintenance and Repair of Facilities +$83,000,000**
• Continue to fund the direct maintenance activities at the NNSA sites across the nuclear security enterprise, including high-risk excess facilities. These costs include labor materials and supplies for corrective, preventive and predictive maintenance activities. It also pays for completing prioritized annual surveillances and preventive maintenance of the vital systems, structures, and components at existing facilities. This program also funds Asset Management Program activities including RAMP. • Specifically, o At KC, fund maintenance of equipment and tenant improvement equipment, and Bannister Road surveillance and maintenance. o At Pantex, fund Bays and Cell maintenance, emerging requirements, and common site support. o At SNL, fund space charge share to support maintenance activities. o At SRS, fund maintenance on tritium facilities and associated equipment and activities associated with gas transfer systems. o At Y-12, fund repairs of identified structural deficiencies in mission essential facilities, fire system surveillances, and repairs. o At LANL, fund maintenance activities at PF-4, CMR, DARHT, LANSCE, Beryllium, waste management, radiological laboratory, and tritium facilities. o At NNSS, funds maintenance of JASPER BEEF, Device Assembly Facility (DAF), and U1a.	• Specifically, o At KC, funds maintenance of equipment and tenant improvement equipment. o At LLNL, funds maintenance activities at Contained Firing Facility, Superblock, HEAF, machine shops, and waste management facilities. o At LANL, funds maintenance activities at PF-4, CMR, DARHT, LANSCE, Beryllium, waste management, radiological laboratory, and tritium facilities. o At NNSS, funds maintenance of JASPER, BEEF, DAF, and U1a. o At Pantex, funds Bays and Cell maintenance, emerging requirements, and support for high explosives activities. o At SNL, funds maintenance activities at MESA, METF, and Tonopah. o At SRS, funds maintenance on tritium facilities and equipment and activities associated with gas transfer systems. o At Y-12, funds maintenance for uranium and lithium operations. o At HQ, funds RAMP and CHAMP centralized procurement activities to increase buying power and accelerate repairs of systems/components that are common across the NNSA enterprise. o Provides for enterprise-wide activities to stabilize the condition of excess facilities to minimize risk to mission prior to disposition.	• The increase provides additional funding to continue the stabilization of deferred maintenance, improve the working condition of NNSA facilities and equipment, expand RAMP, and fully implement the CHAMP.

FY 2016 Enacted	FY 2018 Request	Explanation of Changes FY 2018 vs FY 2016
o At LLNL, funds maintenance activities at Contained Firing Facility, Superblock, HEAF, HE machine shops, and waste management facilities.		

Infrastructure and Operations
Recapitalization

Description

The Recapitalization program, the key to arresting the declining state of NNSA infrastructure, prioritizes investments to improve the condition and extend the design life of the structures, capabilities, and/or systems. The Infrastructure and Safety (I&S) subprogram improves the reliability, sustainability, productivity, and efficiency of NNSA's infrastructure to reduce overall operating costs. It also reduces safety, environmental, and program risk associated with facilities and systems that are often well beyond their design life. The Capability Based Investments (CBI) subprogram is an investment strategy for managing risks in existing capabilities by prioritizing investments to upgrade and improve the reliability, efficiency, and capability of programmatic equipment and associated infrastructure to meet Defense Programs (DP) requirements.

The I&S subprogram includes costs for minor construction projects, capital equipment, and Other Project Costs (OPC) for general purpose infrastructure line item construction projects. I&S also funds deactivation and disposal of excess infrastructure, including stabilization and risk reduction activities at high risk excess facilities, resulting in surveillance and maintenance cost avoidance and reduced risk to workers, the public, the environment, and programs. Recapitalization projects incorporate energy conservation measures to the greatest extent practicable in support of sustainability and energy performance improvements.

The CBI subprogram implements multi-year projects and strategies to sustain, enhance, or replace DP capabilities through focused investments supporting the core programmatic requirements across the enterprise. These investments address needs beyond any single facility, campaign, or weapon system and are essential to achieving program mission objectives. Over the years, DP's science and manufacturing capabilities have been lost or degraded due to aging, broken, or outdated equipment and supporting systems. To support ongoing and future DP weapons activities, CBI invests in projects to reduce risk to the mission and ensure needed capabilities are available for LEPs and other mission work.

CBI provides a corollary to NNSA's line-item construction by funding smaller projects to enhance or sustain critical DP capabilities across the enterprise. CBI projects include: minor construction projects, Capital Equipment Projects, and Operating funded projects that are expensed. The CBI subprogram also funds OPCs for most DP-specific infrastructure line item construction projects. For major system acquisition projects (TEC > $750M), OPCs are funded within the line item. Also, for scientific facilities such as U1a Complex Enhancements Project, the OPCs are requested within Enhanced Capabilities for Subcritical Experiments (ECSE) subprogram within the Science Program. OPCs for Advanced Simulation and Computing (ASC) line item construction projects are requested under ASC.

Tables 5 and 6 show the plans for Recapitalization projects to be executed with FY 2018 funding based on the status of enterprise infrastructure as of May 2017. This plan may need to be updated before the FY 2018 execution year to respond to changing infrastructure conditions.

Table 6

National Nuclear Security Administration Infrastructure and Safety Planned FY 2018 Recapitalization Projects - As of May 2017		
Site	**Project Name**	**FY 2018 Allocation ($K)**
KC	Kirtland Ops NC-135 Site Demolition	4,900
	Bldgs 2 Assembly, Electrical and Fabrication Capital Equipment Replacement and Upgrade	2,079
	Bldgs 2 & 3 Non-destructive Testing Capital Equipment Replacement and Upgrades	2,490
Subtotal, Kansas City National Security Campus		**9,469**
LLNL	B332 Diesel Generator Replacement	1,500
	B806/B810 High Explosives Machining/Assembly HVAC and Electrical Upgrade	4,773
	Site 300 Electrical Utility Display Upgrade	6,750
	Building 363 Disposition	400
	Site-wide Mechanical Utility Valves and Water Distribution Piping Replacement	5,000
	AME Polymers Capabilities Facility	9,900
	HED Physics Precision Target MicroMachining Consolidation and Truss Repair Portfolio	4,750
	LLNL Building 435 Risk Reduction	1,100
Subtotal, Lawrence Livermore National Laboratory		**34,173**
LANL	HE Complex ESH&Q Facility System Upgrades and Replacements	3,480
	CMR Initial Projects to Prepare for Facility Closure Portfolio	1,500
	PF-4 Fire Wall Upgrades	7,000
	TA-16-0303 Renovation for Crystal Lab Relocation	3,000
	PF-4 Fire Water Loop Component Replacements	7,395
	SM-39 Classified Machine Shop Upgrade	4,000
	WETF Gloveboxes & Systems Replacement	5,500
	TA-16-0460 Complex Disposition	1,300
Subtotal, Los Alamos National Laboratory		**33,175**
NNSS	Mercury Building 23-B, 23-C, 23-D, and 23-517 Disposition	1,800
	DAF Domestic Water System Upgrade	4,700
	DAF Electrical Substations Upgrade	5,500
	Mercury Consolidated Operations Complex Building 1 (23-460)	9,000
	U1a Public Address System Replacement	3,000
	U1a Lightning Protection Upgrades	2,000
	DAF Water Storage Tank Renovation	3,000
	U1a Hoist (U1h) Programmable Logic Controller Replacement	1,900
Subtotal, Nevada National Security Site		**30,900**
PX	Bay & Cell RAMS, FDS, & Lead-In Improvements	25,173
	Bldg 12-104A Blast Door Interlock Programmable Logic Controller Replacement	2,000
	Bldg 11-51 Generator and UPS Replacement	5,000
	Bldg 12-44 Equipment Room Expansion	9,200
	Building 12-84E Generator Replacement	2,750
	Building 11-015A Disposition	1,400
Subtotal, Pantex Plant		**45,523**

Site	Project Name	FY 2018 Allocation ($K)
SNL	Coyote Test Field Twin Tanks Piping Replacement	173
	High Voltage System Overhead Switch and Feeder Replacements and Upgrades	4,633
	TA-I Natural Gas System Piping Replacement	1,194
	Mt. Haleakala Facilities Disposition	1,000
	Bldg 878 (Process Development Lab) Renovation	8,500
	California Sanitary Sewer Replacements	7,000
Subtotal, Sandia National Laboratories		**22,500**
SRS	SRS-HANM Obsolete Oxygen Monitor Replacement Portfolio	6,760
	HAOM Tritium Grab Sample Capability Relocation to TEF	1,400
	Analytical Lab Relocation From 234-H to 264-H	3,000
Subtotal, Savannah River Site		**11,160**
Y-12	Nuclear Facilities Electrical Modernization	14,000
	Bldgs 9204-02E, 9212 and 9215 50-Year Sprinkler Head Replacement Portfolio	11,200
	Bldg 9204-2 Concrete Replacement Portfolio	6,000
	Bldg 9204-02E Transformer, Interrupter, Switches and Underground Cable Replacement	2,000
	Bldg 9212 Room 1022A Ventilation System Installation	1,000
	Bldg 9212 302 Steam Supply Station and SF-302 Steam Coil Replacement	1,700
	Bear Creek Road 13.8 kV Electrical Distribution Installation	8,600
	Bldg 9204-02 Elevator #2 Replacement	3,000
	Building 9201-05 (Alpha-5) Risk Reduction	5,600
	Building 9204-04 (Beta-4) Risk Reduction	8,000
	Building 9204-02 Stab-Lok and Fused Electrical Panel Replacement	1,900
	Y-12 - Building 9995 Chilled Water and Steam Condensate Piping Replacement	3,000
Subtotal, Y-12 National Security Complex		**66,000**
	Planning, Assessments, and Infrastructure Management Tools	52,592
	Construction Other Project Costs (OPC)	7,000
Grand Total, Infrastructure and Safety		**312,492**

Table 7

Capabilities Based Investments Planned FY 2018 Recapitalization Projects - As of May 2017		
Site	**Project Name**	**FY 2018 Allocation ($K)**
KC	Big Data Analytics Infrastructure	2,000
	Assembly and Electrical Fabrication Modernization	700
	Rubber & Plastics Production Modernization	1,500
	Special Application Machining Modernization	600
Subtotal, Kansas City National Security Campus		**4,800**
LLNL	LEP and Warhead Assessment Investments	3,200
	Insensitive High Explosives Qualification Capabilities Recapitalization	4,600
	HE Large Charge Machining Recapitalization	2,100
	Hydrodynamic Diagnostic Reliability Project	1,100
	Site 300 OFF Firing & Control System Modernization	900
	Detonation and Dynamic Diagnostics Deployment	1,900
Subtotal, Lawrence Livermore National Laboratory		**13,800**
LANL	Detonator Test Fire Upgrades (Indoor Firing Site TA-40-0015)	4,200
	Replace Lujan Target	400
	DARHT Reliability/Capability Upgrades	4,500
	DARHT Vessel Support	2,900
	DP Line Item OPCs	8,240
Subtotal, Los Alamos National Laboratory		**20,240**
NNSS	U1a Sub-Critical Experiments (SCE) Investments: ARM Support	3,500
	DAF Sub-Critical Experiments Support: SCE Assembly Support	1,500
	Stockpile Stewardship & Management Mission Support	1,900
Subtotal, Nevada National Security Site		**6,900**
PX	Equipment for Mock High Explosives Manufacturing	1,410
	High Explosives Development Machining Capabilities	3,630
	Replace Equipment Skids for 300' Environmental Chambers	900
	Mass Properties Measurement Machine	800
	Replace Two 300' Environmental Chambers	1,400
	Replacement of Machine Tools and Equipment for Special Tooling Fabrication	1,760
	DP Line Item OPCs	2,260
Subtotal, Pantex Plant		**12,160**
SNL	Sandia Silicon Fabrication Revitalization (SSiFR)	24,100
Subtotal, Sandia National Laboratories		**24,100**
SRS	Load Line 6 Upgrades to support loading LEPs and new Major ALTs	3,950
	Modify Unloading Station 'B'	1,150
	DP Line Item OPCs	2,300
Subtotal, Savannah River Site		**7,400**
Y-12	High Energy Digital Radiography System (HEDR)	2,850
	9 MeV Part Positioner	1,375
	2 MeV Part Positioners	475
	Mid Energy Panels	895
	Deploy Wet Chemistry Process Capability	2,405
	Lithium Salt Crusher/Grinder	400
	DP Line Item OPCs	1,900
Subtotal, Y-12 National Security Complex		**10,300**
	CBI Planning, Design, Program Management	12,279
	Corporate Taxes and Assessments	2,871
Grand Total, Capabilities Based Investments		**114,850**

Recapitalization

Activities and Explanation of Changes

FY 2016 Enacted	FY 2018 Request	Explanation of Changes FY 2018 vs FY 2016
Infrastructure and Safety $253,724,000	**Infrastructure and Safety $312,492,000**	**Infrastructure and Safety +$58,768,000**
• Provided funds for needed investments in obsolete/aging facilities and infrastructure to improve safety, reliability, and working conditions.	• Table 5 contains the current FY 2018 project plan as of May 2017. Recapitalization funds are allocated in accordance with planned priorities but retain the flexibility to adjust efforts to address emerging changes in priorities and unplanned failures.	• The increase reflects investments for upgrading aging infrastructure to address safety and programmatic risks, improve productivity, and lower operating costs.
Capability Based Investments $98,800,000	**Capability Based Investments $114,850,000**	**Capability Based Investments +$16,050,000**
• CBI provided targeted, strategic investments for life-extension and modernization of enduring requirements needed to sustain DP's capabilities. CBI funded projects across the nuclear security enterprise including continued investments to: support LEP assessments at LLNL, support the B61 LEP environmental testing needs at LANL, revitalize silicon fabrication capabilities at SNL, modify gas unloading stations at SRS, and support DP's mission across the nuclear security enterprise. Additional FY 2016 projects included: o At LLNL, investment in insensitive high explosive qualification capabilities. o At LANL, upgrades to surveillance capabilities at the DARHT facility. o At NNSS, equipment and facilities for subcritical experiments at the DAF and U1a Complex. o At Pantex, investment in SNM work stations, production tooling, and diagnostic equipment to support weapons life extension activities.	• CBI continues to provide targeted, strategic investments for life-extension and modernization of enduring requirements needed to sustain Defense Program's capabilities. Table 6 contains the current FY 2018 project plan as of May 2017. • CBI will provide funding to implement projects across the nuclear security enterprise including continued investments to: support LEP assessments and Insensitive High Explosives (IHE) capabilities at LLNL, upgrade surveillance capabilities at LANL's DARHT facility, replace production and diagnostic equipment to support B61 LEP activities at Pantex and Y-12, revitalize silicon fabrication capabilities at SNL, provide lithium material manufacturing capabilities at Y-12, and support DP's mission across the nuclear security enterprise. Additional FY 2018 projects include: o At KCNSC, modernization of equipment and capabilities on production lines supporting the W88 Alteration Program. o At LANL, upgrade a detonator test fire facility.	• Planning and design of CBI projects was previously funded by the Strategic Planning Efforts subprogram under DSW and has been moved into CBI. • There has also been a significant increase in projects at KCNSC, LLNL, SRS, and Y-12 that will provide vital capabilities supporting multiple LEPs. These projects have recently been documented in Interface Requirements Agreements (IRAs) with the B61-12 LEP, W88 Alteration Program, and W80-4 LEP.

FY 2016 Enacted	FY 2018 Request	Explanation of Changes FY 2018 vs FY 2016
o At Y-12, investment in lithium processing capabilities and equipment to support LEP activities. o At KCNSC, initial CBI funding to replace deteriorated laboratory and manufacturing equipment. • CBI provided funding for most of DP's OPCs for line item construction projects.	o At NNSS, increased investment in capabilities supporting subcritical experiments at U1a and DAF. o At Pantex, restore HE machining capabilities and replace machine tools and equipment. o At SRS, GTS load line upgrades to support the B61-12 LEP. • CBI will continue funding DP's OPCs for line item construction projects.	

Infrastructure and Operations
Construction

Description

The Construction subprogram plays a critical role in revitalizing the nuclear security enterprise including the nuclear weapons manufacturing and research and development infrastructure. Investments from this subprogram will improve the responsiveness and utility of the infrastructure and its technology base. The subprogram is focused on two primary objectives: (1) identification, planning, and prioritization of the projects supporting national security objectives, particularly the weapons programs, and (2) development and execution of these projects within approved cost and schedule baselines. Table 7 shows the breakout of funding by line item.

The UPF at Y-12 consists of processing capabilities for enriched uranium casting, oxide production, and salvage and accountability operations. The UPF project includes a Main Process Building (MPB), a Salvage and Accountability Building (SAB), a Mechanical Electrical Building (MEB), and various support facilities. Constructing multiple facilities allows each facility to be designed and constructed with a level of safety and security appropriate for the hazards of each operation. FY 2018 funds will be used for construction/long-lead procurement for the MPB, MEB, and SAB subprojects. The Department is committed to complete UPF by 2025 for no more than $6,500,000,000. This commitment is predicated on receiving consistent and stable funding profiles as requested.

In addition, FY 2018 funding will be used for construction of the TLW at LANL. The 100 percent design and safety basis documents for the project were completed in February 2017 and are being reviewed by the subject matter experts. Funding is also requested for the Tritium Production Capability Project at the Savannah River Site and will be used to start the design and prepare safety basis documents.

Under the CMRR Project, FY 2018 construction funding includes funding for subprojects reflected in the CMRR project data sheet: RLUOB Equipment Installation Phase 2 (REI2) and PF-4 Equipment Installation Phase 1 (PEI1), PF-4 Equipment Installation Phase 2 (PEI2) and Re-categorization to Hazard Category 3 (RC3). The Administration supports Congressional direction to consolidate ECSE activities, including UCEP, in the Science Program.

The Request for FY 2018 supports the Y-12 Fire Station project. The current Y-12 fire station was built in 1948, is located within the most highly protected area of the plant, and is close to Y-12’s most hazardous operations. Seismic, tornado, hazardous material release, and security events could render the fire station inaccessible. The facility has exceeded its useful life and needs to be replaced to assure long term emergency management response to the site. Funding is also requested to support the construction of the Emergency Operations Center at Y-12 and the construction of the Expand Electrical Distribution System project at LLNL.

Requested FY 2018 funding will also support the construction of the Albuquerque Complex Project, which will replace the current inadequate Albuquerque Complex facilities with the construction of a new facility on DOE property adjacent to the Kirtland Air Force Base.

Table 8

Site	FY 2016	FY 2017	FY 2018
18-D-660, Fire Station, Y-12	0	0	28,000
18-D-650, Tritium Production Capability, SRS	0	0	6,800
17-D-640, U1a Complex Enhancements Project, NNSS	0	11,500	22,100
17-D-630, Expand Electrical Distribution System, LLNL	0	25,000	6,000
17-D-125, RLUOB Reconfiguration Project, LANL	0	1,000	0
17-D-126 PF-4 Reconfiguration Project, LANL	0	8,000	0
16-D-621, TA-3 Substation Replacement, LANL	25,000	0	0
16-D-515, Albuquerque Complex Project	8,000	15,047	98,000
15-D-613, Emergency Operations Center, Y-12	17,919	2,000	7,000
15-D-302, TA-55 Reinvestment Project, Phase 3, LANL	18,195	2,000	0
11-D-801, TA-55 Reinvestment Project, Phase 2, LANL	3,903	0	0
07-D-220, Radioactive Liquid Waste Treatment Facility Upgrade Project, LANL	11,533	0	2,100
07-D-220-04, Transuranic Liquid Waste Facility, LANL	40,949	17,053	17,895
06-D-141, Uranium Processing Facility, Y-12	430,000	575,000	663,000
Chemistry and Metallurgy Replacement (CMRR)			
04-D-125, Chemistry and Metallurgy Research Replacement Project, LANL	0	0	180,900
04-D-125-04 RLUOB Equipment Installation, Phase 2	117,000	75,000	0
04-D-125-05 PF-4 Equipment Installation	38,610	75,615	0
Subtotal, 04-D-125 CMRR Project, LANL	155,610	150,615	180,900
Total, Infrastructure and Operations: Construction	**711,109**	**807,215**	**1,031,795**

Construction

Activities and Explanation of Changes

FY 2016 Enacted	FY 2018 Request	Explanation of Changes FY 2018 vs FY 2017
Construction $711,109,000	**Construction $1,031,795,000**	**Construction +$320,686,000**
• Commenced subprojects reflected in the Chemistry and Metallurgy Research Replacement (CMRR) project – RLUOB Equipment Installation Phase 2 (REI2), PF-4 Equipment Installation Phase 1 (PEI1), and PF-4 Equipment Installation Phase 2 (PEI2). • Continued design, subprojects, and site preparation activities for UPF at Y-12. • Continued construction of TA-55 Reinvestment Project (TRP)-II, Phase C subproject and the RLWTF Low Level Liquid Waste (LLW) subproject at LANL. • Continued design of the TLW Facility at LANL. Continued design and started construction activities in the first quarter of FY 2017 for the EOC at Y-12. • Started design and construction activities for Substation Replacement at TA-3, LANL.	• Continue execution of CMRR subprojects (REI2, PEI1, and PEI2) and commence Re-categorization to Hazard Category 3 (RC3) subproject. • Complete construction of the RLWTF LLW subproject at LANL. • Continue construction of the TLW Facility at LANL. • Continue design activities and construction of approved subprojects for UPF at Y-12. • Continue design and construction of the U1a Complex Enhancements Project at NNSS. • Initiate design and construction of the Fire Station at Y-12. • Continue execution of the Expand Electrical Distribution System Project at LLNL and the EOC at Y-12. • Initiate construction of the Albuquerque Complex Project. • Initiate design of the Tritium Production Capability Project at SRS.	• The increase primarily reflects funding for construction of the UPF; CMRR project; Albuquerque Complex Project; UCEP, Expansion of the Electrical Distribution System at LLNL; and new starts for the Y-12 Fire Station and Tritium Production Capability at SRS.

Infrastructure and Operations
Performance Measures

In accordance with the GPRA Modernization Act of 2010, the Department sets targets for, and tracks progress toward, achieving performance goals for each program.

	FY 2016	FY 2017	FY 2018
Performance Goal (Measure)	**Construction Projects (formerly Major Construction Projects) -** Execute construction projects within approved costs and schedules, as measured by the total percentage of projects with total estimated cost (TEC) greater than $20 million with a schedule performance index (ratio of budgeted cost of work performed to budgeted cost of work scheduled) and a cost performance index (ratio of budgeted cost of work performed to actual cost of work performed) between 0.9-1.15.		
Target	90 % of projects	90 % of projects	90 % of projects
Result	Not Met - 60	TBD	TBD
Endpoint Target	Annually achieve 90% of baselined construction projects with TEC greater than $20M with actual SPI and CPI of 0.9-1.15 as measured against approved baseline definitions.		
Performance Goal (Measure)	**Operations of Facilities -** Enable NNSA missions by providing operational facilities to support nuclear weapon dismantlement, life extension, surveillance, and research and development activities, as measured by percent of scheduled versus planned days mission-critical and mission-dependent facilities are available without missing key deliverables.		
Target	85 % of availability	85 % of availability	85 % of availability
Result	Exceeded - 98	TBD	TBD
Endpoint Target	Mission critical and mission dependent facilities are available at least 85% of scheduled days annually.		
Performance Goal (Measure)	**Maintenance -** Percentage of preventative maintenance (PM) spending vs total maintenance (TM).		
Target	40 % PM conducted	35 % PM conducted	36 % PM conducted
Result	Not Met - 34	TBD	TBD
Endpoint Target	PM to TM target is 50%.		

	FY 2016	FY 2017	FY 2018
Performance Goal (Measure)	**Recapitalization -** Percentage of NNSA assets rated as adequate (by Replacement Plant Value).		
Target	39 % of projects	37 % of projects	37.5 % of projects
Result	Not Met - 37	TBD	TBD
Endpoint Target	44% of NNSA assets rated as adequate.		

	FY 2016	FY 2017	FY 2018
Performance Goal (Measure)	**Environmental Monitoring and Remediation -** Annual percentage of environmental monitoring and remediation deliverables that are required by regulatory agreements to be conducted at NNSA sites under Long Term Stewardship (LTS) that are executed on schedule and in compliance with all acceptance criteria.		
Target	95 % of deliverables	95 % of deliverables	95 % of deliverables
Result	Exceeded - 100	TBD	TBD
Endpoint Target	Annually, submit on schedule and receive regulatory approval of at least 95% of all environmental monitoring and remediation deliverables that are required at NNSA sites under LTS by regulatory agreements.		

[a] Due to the nature of reporting requirements in the capital summary tables of the Infrastructure and Operations program, FY 2017 Enacted was included to accurately list planned projects.
[b] In FY 2017, $500,000 will be funded from Capability Based Investments and $7,800,000 will be funded in Weapons Dismantlement Disposition under the Directed Stockpile Work program.

	Total	Prior Years	FY 2016 Enacted	FY 2016 Current	FY 2017 Enacted	FY 2018 Request	FY 2018 vs FY 2017	Outyears to Completion
	(Dollars in Thousands)							
Capital Operating Expenses Summary (including (Major Items of Equipment (MIE))								
Capital Equipment >$500K (including MIE)	N/A	N/A	18,450	26,400	38,008	17,918	-20,090	44,114
Plant Projects (GPP and IGPP)	N/A	N/A	53,590	67,662	123,072	131,770	+8,698	36,817
Total, Capital Operating Expenses	**N/A**	**N/A**	**72,040**	**94,062**	**161,080**	**149,688**	**-11,392**	**80,931**
Capital Equipment > $500K (including MIE)								
Total Non-MIE Capital Equipment	N/A	N/A	8,450	16,400	20,058	13,488	-6,570	16,304
HE Synthesis Pilot Plant, LLNL	9,500	0	4,000	8,000	1,500	0	-1,500	0
Parts Cleaning for Direct Lithium Material Manufacturing, Y-12 [b]	10,300	0	2,000	2,000	8,300	0	-8,300	0
Molecular Beam Epitaxy Tool, SNL	11,750	0	4,000	0	0	0	+0	11,750
Reestablish HE Development Machining Capabilities, PX	6,780	0	0	0	3,150	3,630	+480	0
Single Ion Implanter, SNL	5,000	0	0	0	5,000	0	-5,000	0
Replace Lujan Target, LANL	8,000	0	0	0	0	400	+400	7,600
Lithium Salt Crusher/Grinder, Y-12	8,860	0	0	0	0	400	+400	8,460
Total, Capital Equipment (including MIE)	**N/A**	**N/A**	**18,450**	**26,400**	**38,008**	**17,918**	**-20,090**	**44,114**

	(Dollars in Thousands)							
	Total	Prior Years	FY 2016 Enacted	FY 2016 Current	FY 2017 Enacted	FY 2018 Request	FY 2018 vs FY 2017	Outyears to Completion
Plant Projects (GPP and IGPP)								
Total Plant Projects (GPP) (Total Estimated Cost (TEC) <$5M)	N/A	N/A	2,820	17,210	42,893	51,020	+8,127	14,730
Facility Modifications (White Space Expansion) to Support Weapons Production, KC	7,600	6,300	1,700	1,300	0	0	+0	0
PF-4 Fire Wall Upgrades, LANL	7,000	0	0	0	0	7,000	+7,000	0
Site 300 Firing Site Support Systems Upgrade, LLNL	5,000	0	0	0	5,000	0	-5,000	0
Site 300 Electrical Utility Display Upgrade, LLNL	6,750	0	0	0	0	6,750	+6,750	0
Dynamic Equation of State Facilities Modernization, LANL	8,300	1,000	6,500	7,300	0	0	+0	0
RANT Seismic Upgrades, LANL	7,840	0	1,500	1,500	6,340	0	-6,340	0
CSI - Hill 200 Electrical Replacement, NNSS	8,413	1,613	7,000	6,800	0	0	+0	0
DAF Electric and Backup Power Replacement, NNSS	9,200	1,000	6,200	6,200	2,000	0	-2,000	0
DAF Electrical Substations Upgrade, NNSS	5,500	0	0	0	0	5,500	+5,500	0
Mission Corridor Consolidation, NNSS	6,300	0	0	0	6,300	0	-6,300	0
Water/Wastewater Systems - CP Hill Water Line Replacement, NNSS	7,000	0	0	0	7,000	0	-7,000	0
New Mercury Consolidated Operations Complex Building 1 (23-460), NNSS	9,000	0	0	0	0	9,000	+9,000	0
Gas Lab Facility Replacement, PX	9,989	0	5,000	0	4,989	0	-4,989	5,000
Building 12-44 Equipment Room Expansion, PX	9,200	0	0	0	0	9,200	+9,200	0
B6588 (Annular Core Research Reactor) Facility Renovation, SNL	5,600	0	0	600	5,000	0	-5,000	0
C914 Seismic Upgrades to Achieve Code Compliance, SNL	9,800	0	500	100	0	0	+0	9,700

	(Dollars in Thousands)							
	Total	**Prior Years**	**FY 2016 Enacted**	**FY 2016 Current**	**FY 2017 Enacted**	**FY 2018 Request**	**FY 2018 vs FY 2017**	**Outyears to Completion**
B827 (Primary Standards Laboratory) Renovation, SNL	6,500	0	500	740	5,760	0	-5,760	0
B862 (Standby Power Plant) Upgrades, SNL	8,500	0	3,000	2,760	5,740	0	-5,740	0
B870 (Neutron Generator Production) Refurbishments, SNL	6,000	0	6,000	6,000	0	0	+0	0
B878 (Process Development Lab) Renovation, SNL	8,500	0	0	0	0	8,500	+8,500	0
SNL/CA Sanitary Sewer Replacements	7,000	0	0	0	0	7,000	+7,000	0
234-7H Air Handler Units Replacement, SRS	8,810	5,155	1,260	2,060	1,595	0	-1,595	0
Building 9204-2 Kathabar Replacement , Y-12	8,600		6,000	7,300	1,300	0	-1,300	0
Criticality Accident Alarm System Replacement, Y-12	6,700	0	0	0	6,700	0	-6,700	0
Bear Creek Road 13.8kV Electrical Power Distribution Installation, Y12	8,600	0	0	0	0	8,600	+8,600	0
3rd St 13.8kV Electrical Power Distribution Installation, Y12	5,425	0	0	0	5,425	0	-5,425	0
New AME Polymers Capabilities Facility, LLNL	9,900	0	0	0	0	9,900	+9,900	0
Battery Test Facility, SNL	7,600	0	0		7,600	0	-7,600	0
Modify Unloading Station B, SRS	6,650	5,500	1,000	0	0	1,150	+1,150	0
Environmental Testing Capability Investments for B61 and other LEPs (ARMAG), LANL	8,659	5,100	2,000	3,029	530	0	-530	0
Weather Enclosure at DARHT, LANL	7,890	0	1,000	1,000	1,000	0	-1,000	5,890
Detonator Test Fire Upgrades (Indoor Firing Site TA-40-0015), LANL	7,500	0	0	1,000	2,300	4,200	+1,900	0
Non-Destructive Laser Gas Sampling (CSA Certification), PX	5,210	0	1,610	1,610	3,600	0	-3,600	0
Load Line 6 Upgrades, SRS	8,600	0	0	1,153	2,000	3,950	+1,950	1,497
Total, Plant Projects (GPP)	**N/A**	**N/A**	**53,590**	**67,662**	**123,072**	**131,770**	**+8,698**	**36,817**
Total, Capital Summary	**N/A**	**N/A**	**72,040**	**94,062**	**161,080**	**149,688**	**-11,392**	**80,931**

Construction Projects Summary

(Dollars in Thousands)

	Total	Prior Years	FY 2016 Enacted	FY 2016 Current	FY 2017 Enacted	FY 2018 Request	FY 2018 vs FY 2017
19-D-XXX, Zone 11 High Pressure Fire Loop, PX							
Total Estimated Cost (TEC)	81,000	0	0	0	0	0	0
Other Project Cost (OPC)	5,800	0	0	0	500	1,600	+1,100
TPC, 19-D-XXX, Zone 11 High Pressure Fire Loop, PX	**86,800**	**0**	**0**	**0**	**500**	**1,600**	**+1,100**
19-D-XXX, 138K Power Distribution System Replacement, NNSS							
TEC	65,000	0	0	0	0	0	0
OPC	2,900	0	0	0	500	600	+100
TPC, 19-D-XXX, 138K Power Distribution System Replacement, NNSS	**67,900**	**0**	**0**	**0**	**500**	**600**	**+100**
19-D-XXX, Lithium Production Facility, Y-12							
TEC	650,000	0	0	0	0	0	0
OPC	70,000	2,000	3,800	3,800	1,600	0	-1,600
TPC, 19-D-XXX, Lithium Production Facility, Y-12	**720,000**	**2,000**	**3,800**	**3,800**	**1,600**	**0**	**-1,600**
18-D-660, Fire Station, Y-12							
TEC	28,000	0	0	0	0	28,000	+28,000
OPC	5,830	1,160	458	458	2,000	1,000	-1,000
TPC, 18-D-660, Fire Station, Y-12	**33,830**	**1,160**	**458**	**458**	**2,000**	**29,000**	**+27,000**
18-D-650, Tritium Production Capability, SRS							
TEC	425,000	0	0	0	0	6,800	+6,800
OPC	74,000	2,000	2,100	2,100	3,000	3,000	0
TPC, 18-D-650, Tritium Production Capability, SRS	**499,000**	**2,000**	**2,100**	**2,100**	**3,000**	**9,800**	**+6,800**
17-D-640, U1a Complex Enhancements Project, NNSS							
TEC	151,500	0	0	0	11,500	22,100	+10,600
OPC [a]	7,109	0	3,609	3,609	1,700	1,000	-700
TPC, 17-D-640, U1a Complex Enhancements Project, NNSS	**158,609**	**0**	**3,609**	**3,609**	**13,200**	**23,100**	**+9,900**

[a] U1a Complex Enhancements Project OPCs are funded under Enhanced Capabilities for Subcritical Experiments within the Science Program.

	(Dollars in Thousands)						
	Total	Prior Years	FY 2016 Enacted	FY 2016 Current	FY 2017 Enacted	FY 2018 Request	FY 2018 vs FY 2017
17-D-630, Expand Electrical Distribution System, LLNL							
TEC	31,000	0	0	0	25,000	6,000	-19,000
OPC	2,800	1,000	400	400	200	400	+200
TPC, 17-D-630, Expand Electrical Distribution System, LLNL	**33,800**	**1,000**	**400**	**400**	**25,200**	**6,400**	**-18,800**
17-D-125, RLUOB Reconfiguration Project, LANL							
TEC	0	0	0	0	0	0	0
OPC	1,000	0	0	0	1,000	0	-1,000
TPC, 17-D-125, RLUOB Reconfiguration Project, LANL	**1,000**	**0**	**0**	**0**	**1,000**	**0**	**-1,000**
17-D-126, PF-4 Reconfiguration Project, LANL							
TEC	8,000	0	0	0	8,000	0	-8,000
OPC	0	0	0	0	0	0	0
TPC, 17-D-125, RLUOB Reconfiguration Project, LANL	**8,000**	**0**	**0**	**0**	**8,000**	**0**	**-8,000**
16-D-621, TA-3 Substation Replacement, LANL							
TEC	25,000	0	25,000	25,000	0	0	0
OPC	3,650	1,473	750	750	600	500	-100
TPC, 16-D-621, TA-3 Substation Replacement, LANL	**28,650**	**1,473**	**25,750**	**25,750**	**600**	**500**	**-100**
16-D-515, Albuquerque Complex Project							
TEC	169,000	0	8,000	8,000	15,047	98,000	+82,953
OPC [a]	33,000	250	2,456	2,456	0	550	+550
TPC, 16-D-515, Albuquerque Complex Project	**202,000**	**250**	**10,456**	**10,456**	**15,047**	**98,550**	**+83,503**
15-D-613, Emergency Operations Center, Y-12							
TEC	28,919	2,000	17,919	17,919	2,000	7,000	+5,000
OPC	5,482	2,000	750	750	500	750	+250
TPC, 15-D-613, Emergency Operations Center, Y-12	**34,401**	**4,000**	**18,669**	**18,669**	**2,500**	**7,750**	**+5,250**

[a] In FY 2015, $250,000 in OPCs for the Albuquerque Complex Project were funded within the NNSA Federal Salaries and Expenses appropriation.

	(Dollars in Thousands)						
	Total	Prior Years	FY 2016 Enacted	FY 2016 Current	FY 2017 Enacted	FY 2018 Request	FY 2018 vs FY 2017
15-D-612, Emergency Operations Center, LLNL							
TEC	20,000	0	0	0	0	0	0
OPC	3,592	392	500	500	600	600	0
TPC, 15-D-612, Emergency Operations Center, LLNL	**23,592**	**392**	**500**	**500**	**600**	**600**	**0**
15-D-611, Emergency Operations Center, SNL							
TEC	40,000	0	0	0	0	0	0
OPC	2,100	700	0	0	200	200	0
TPC, 15-D-611, Emergency Operations Center, SNL	**42,100**	**700**	**0**	**0**	**200**	**200**	**0**
15-D-302, TA-55 Reinvestment Project Phase III, LANL							
TEC	144,053	16,062	18,195	18,195	2,000	0	-2,000
OPC	35,500	7,500	3,000	3,000	2,000	3,000	+1,000
TPC, 15-D-302, TA-55 Reinvestment Project Phase III, LANL	**179,553**	**23,562**	**21,195**	**21,195**	**4,000**	**3,000**	**-1,000**
12-D-301, TRU Waste Facilities, LANL							
TEC	83,990	83,990	0	0	0	0	0
OPC	22,874	18,850	3,322	3,322	702	0	-702
TPC, 12-D-301, TRU Waste Facilities, LANL	**106,864**	**102,840**	**3,322**	**3,322**	**702**	**0**	**-702**
11-D-801, TA-55 Reinvestment Project, Phase II, LANL							
TEC	97,464	93,561	3,903	3,903	0	0	0
OPC	14,462	10,422	3,015	3,015	1,025	0	-1,025
TPC, 11-D-801, TA-55 Reinvestment Project, Phase II, LANL	**111,926**	**103,983**	**6,918**	**6,918**	**1,025**	**0**	**-1,025**
10-D-501, Nuclear Facility Risk Reduction, Y-12							
TEC	65,796	65,776	0	0	0	0	0
OPC	10,000	9,022	978	978	0	0	0
TPC, 10-D-501, Nuclear Facility Risk Reduction, Y-12	**75,796**	**74,798**	**978**	**978**	**0**	**0**	**0**
08-D-802, High Explosive Pressing Facility, PX							
TEC	140,397	123,276	0	0	0	0	0
OPC	4,829	3,489	1,000	1,000	340	0	-340
TPC, 08-D-802, High Explosive Pressing Facility, PX	**145,226**	**126,765**	**1,000**	**1,000**	**340**	**0**	**-340**

(Dollars in Thousands)

	Total	Prior Years	FY 2016 Enacted	FY 2016 Current	FY 2017 Enacted	FY 2018 Request	FY 2018 vs FY 2017
07-D-220, Radioactive Liquid Waste Treatment Facility Upgrade, LANL							
TEC [a]	106,306	90,004	11,533	11,533	2,669	2,100	-569
OPC	19,945	12,945	3,741	3,741	259	2,700	+2,441
TPC, 07-D-220, Radioactive Liquid Waste Treatment Facility Upgrade, LANL	**126,251**	**102,949**	**15,274**	**15,274**	**2,928**	**4,800**	**+1,872**
07-D-220-04, Transuranic Liquid Waste Facility, LANL							
TEC [b]	92,849	18,105	40,949	40,949	15,900	17,895	+1,995
OPC	12,940	657	2,061	2,061	1,500	1,500	0
TPC, 07-D-220-04, Transuranic Liquid Waste Facility, LANL	**105,789**	**18,762**	**43,010**	**43,010**	**17,400**	**19,395**	**+1,995**
06-D-141, Uranium Processing Facility, Y-12							
TEC	6,074,500	1,459,968	430,000	430,000	574,500	662,000	+87,500
OPC	425,500	95,128	0	0	500	1,000	+500
TPC, 06-D-141, Uranium Processing Facility, Y-12	**6,500,000**	**1,555,096**	**430,000**	**430,000**	**575,000**	**663,000**	**+88,000**
04-D-125, Chemistry and Metallurgy Research Replacement, LANL							
TEC	2,265,415	877,140	146,610	146,610	126,597	142,908	+16,311
OPC	602,815	106,343	9,000	9,000	24,018	37,992	+13,974
TPC, 04-D-125, Chemistry and Metallurgy Research Replacement, LANL	**2,868,230**	**983,483**	**155,610**	**155,610**	**150,615**	**180,900**	**+30,285**
Total All Construction Projects							
TEC	10,793,189	2,829,882	702,109	702,109	783,213	992,803	209,590
OPC	1,366,128	275,331	40,940	40,940	42,744	56,392	13,648
TPC All Construction Projects	**12,159,317**	**3,105,213**	**743,049**	**743,049**	**825,957**	**1,049,195**	**+223,238**

[a] In FY 2017, $2,669,265.19 was reprogrammed to Radioactive Liquid Waste Treatment Facility to support the Low Level Liquid Waste Facility subproject.
[b] In FY 2017, $1,153,300 was reprogrammed from Transuranic Liquid Waste Facility project into Radioactive Liquid Waste Treatment Facility to support the Low Level Liquid Waste Facility subproject.

tyears to Completion for Infrastructure and Operations Construction

	(Dollars in Thousands)				
	FY 2019 Request	**FY 2020 Request**	**FY 2021 Request**	**FY 2022 Request**	**Outyears to Completion**
19-D-XXX, Zone 11 High Pressure Fire Loop, PX					
Total Estimated Cost (TEC)	10,000	12,000	29,000	30,000	0
Other Project Cost (OPC)	750	750	1,000	1,200	
TPC, 19-D-XXX, Zone 11 High Pressure Fire Loop, PX	**10,750**	**12,750**	**30,000**	**31,200**	**0**
19-D-XXX, 138K Power Distribution System Replacement, NNSS					
TEC	15,000	30,000	20,000	0	0
OPC	700	700	400	0	0
TPC, 19-D-XXX, 138K Power Distribution System Replacement, NNSS	**15,700**	**30,700**	**20,400**	**0**	**0**
19-D-XXX, Lithium Production Facility, Y-12					
TEC	28,500	34,500	53,000	34,000	500,000
OPC	1,900	3,000	3,000	3,000	51,700
TPC, 19-D-XXX, Lithium Production Facility, Y-12	**30,400**	**37,500**	**56,000**	**37,000**	**551,700**
18-D-660, Fire Station, Y-12					
TEC	0	0	0	0	0
OPC	400	812	0	0	0
TPC, 18-D-660, Fire Station, Y-12	**400**	**812**	**0**	**0**	**0**
18-D-650, Tritium Production Capability, SRS					
TEC	25,505	49,500	13,000	22,000	308,195
OPC	3,000	3,000	3,000	3,000	51,900
TPC, 18-D-650, Tritium Production Capability, SRS	**28,505**	**52,500**	**16,000**	**25,000**	**360,095**
17-D-640, U1a Complex Enhancements Project, NNSS					
TEC	63,000	35,000	19,900	0	0
OPC	800	0	0	0	0
TPC, 17-D-640, U1a Complex Enhancements Project, NNSS	**63,800**	**35,000**	**19,900**	**0**	**0**

	(Dollars in Thousands)				
	FY 2019 Request	**FY 2020 Request**	**FY 2021 Request**	**FY 2022 Request**	**Outyears to Completion**
17-D-630, Expand Electrical Distribution System, LLNL					
TEC	0	0	0	0	0
OPC	200	200	400	0	0
TPC, 17-D-630, Expand Electrical Distribution System, LLNL	**200**	**200**	**400**	**0**	**0**
17-D-125, RLUOB Reconfiguration Project, LANL					
TEC	0	0	0	0	0
OPC	0	0	0	0	0
TPC, 17-D-125, RLUOB Reconfiguration Project, LANL	**0**	**0**	**0**	**0**	**0**
17-D-126, PF-4 Reconfiguration Project, LANL					
TEC	0	0	0	0	0
OPC	0	0	0	0	0
TPC, 17-D-125, RLUOB Reconfiguration Project, LANL	**0**	**0**	**0**	**0**	**0**
16-D-621, TA-3 Substation Replacement, LANL					
TEC	0	0	0	0	0
OPC	327	0	0	0	0
TPC, 16-D-621, TA-3 Substation Replacement, LANL	**327**	**0**	**0**	**0**	**0**
16-D-515, Albuquerque Complex Project, ABQ					
TEC	47,953	0	0	0	0
OPC	600	3,100	3,300	22,744	0
TPC, 16-D-515, Albuquerque Complex Project, ABQ	**48,553**	**3,100**	**3,300**	**22,744**	**0**
15-D-613, Emergency Operations Center, Y-12					
TEC	0	0	0	0	0
OPC	1,000	482	0	0	0
TPC, 15-D-613, Emergency Operations Center, Y-12	**1,000**	**482**	**0**	**0**	**0**

(Dollars in Thousands)

	FY 2019 Request	FY 2020 Request	FY 2021 Request	FY 2022 Request	Outyears to Completion
15-D-612, Emergency Operations Center, LLNL					
TEC	20,000	0	0	0	0
OPC	500	500	500	0	0
TPC, 15-D-612, Emergency Operations Center, LLNL	**20,500**	**500**	**500**	**0**	**0**
15-D-611, Emergency Operations Center, SNL					
TEC	40,000	0	0	0	0
OPC	500	500	0	0	0
TPC, 15-D-611, Emergency Operations Center, SNL	**40,500**	**500**	**0**	**0**	**0**
15-D-302, TA-55 Reinvestment Project Phase III, LANL					
TEC	17,500	12,996	0	22,000	55,300
OPC	3,000	3,000	3,000	3,000	8,000
TPC, 15-D-302, TA-55 Reinvestment Project Phase III, LANL	**20,500**	**15,996**	**3,000**	**25,000**	**63,300**
07-D-220, Radioactive Liquid Waste Treatment Facility Upgrade, LANL					
TEC	0	0	0	0	0
OPC	300	0	0	0	0
TPC, 07-D-220, Radioactive Liquid Waste Treatment Facility Upgrade, LANL	**300**	**0**	**0**	**0**	**0**
07-D-220-04, Transuranic Liquid Waste Facility, LANL					
TEC	0	0	0	0	0
OPC	2,000	1,710	1,000	2,000	512
TPC, 07-D-220-04, Transuranic Liquid Waste Facility, LANL	**2,000**	**1,710**	**1,000**	**2,000**	**512**
06-D-141, Uranium Processing Facility, Y-12					
TEC	720,000	725,000	730,000	580,000	193,032
OPC	2,000	10,000	10,000	50,000	256,872
TPC, 06-D-141, Uranium Processing Facility, Y-12	**722,000**	**735,000**	**740,000**	**630,000**	**449,904**

	(Dollars in Thousands)				
	FY 2019 Request	FY 2020 Request	FY 2021 Request	FY 2022 Request	Outyears to Completion
04-D-125, Chemistry and Metallurgy Research Replacement, LANL					
TEC	160,095	182,000	221,899	244,000	166,163
OPC	76,000	57,600	52,101	45,000	194,761
TPC, 04-D-125, Chemistry and Metallurgy Research Replacement, LANL	**236,095**	**239,600**	**274,000**	**289,000**	**360,924**
Total All Construction Projects					
TEC	1,147,553	1,080,996	1,086,799	932,000	1,222,690
OPC	93,977	85,354	77,701	129,944	563,745
TPC All Construction Projects	**1,241,530**	**1,166,350**	**1,164,500**	**1,061,944**	**1,786,435**

18-D-660, Fire Station
Y-12 National Security Complex, Oak Ridge, Tennessee
Project is for Design and Construction

Significant Changes and Summary

Significant Changes

This Construction Project Data Sheet (CPDS) is new and includes a new start for the budget year.

Summary

The most recent DOE O 413.3B approved CD is CD-0, Approve Mission Need, approved on February 12, 2016, with a preliminary cost range of $10,000 to $45,000 and a projected CD-4 of 4Q FY 2021.

A Federal Project Director has been assigned to this project and has approved this CPDS.

The project will design and construct a Fire Protection Operations Center at the Y-12 National Security Complex. The building is estimated to be approximately 35,000 square feet, single story and will provide response to all emergency response requirements at the Y-12 site. The new building will be energy sustainable and will be designed with close consideration of Leadership in Energy and Environmental Design (LEED) Gold standards.

Critical Milestone History[a]

	CD-0	Conceptual Design Complete	CD-1	CD-2	Final Design Complete	CD-3	D&D Complete	CD-4
FY 2018	02/12/2016	09/07/2016	3Q FY 2017	2Q FY 2018	2Q FY 2019	2Q FY 2018	N/A	4Q FY 2021

CD-0 – Approve Mission Need
Conceptual Design Complete – Actual date the conceptual design was completed
CD-1 – Approve Alternative Selection and Cost Range
CD-2 – Approve Performance Baseline
Final Design Complete – Estimated date the project design will be completed
CD-3 – Approve Start of Construction
D&D Complete – Completion of D&D work (see Section 9)
CD-4 – Approve Start of Operations or Project Closeout
PB – Indicates the Performance Baseline

[a] The schedules are only estimates and will be updated upon CD-2 approval.

	Performance Baseline Validation
FY 2018	2Q FY 2018

Project Cost History[ac]
(dollars in thousands)

	TEC, Design	TEC, Construction	TEC, Total	OPC Except D&D	OPC, D&D	OPC, Total	TPC
FY 2018	6,000	33,170	39,170	5,830	N/A	5,830	45,000

Project Scope and Justification

Scope

The project scope is to design and build a Fire Protection Operations Center at the Y-12 National Security Complex. The building is estimated to be approximately 35,000 square feet, single story and will provide response to all emergency response requirements at the Y-12 site. The new building will be energy sustainable and will be designed with close consideration of Leadership in Energy and Environmental Design (LEED) Gold standards. The final scope will be established at the time the project CD-2/3 is approved.

Justification

The current Y-12 fire station was built in 1948 and is currently located within the most highly protected area of the plant. In addition, Building 9710-2 is located in close proximity to Y-12's most hazardous operations. Seismic, tornado, hazardous material release, and security events could render the fire station inaccessible. Many of the hazardous materials releases analyzed in the Emergency Planning Hazard Assessments (EPHAs) have a very short travel time before impacting the fire station. Access to the facility by off-duty personnel is critical, since these personnel augment the duty staff. Although upgrades have been performed over the years, this base facility has exceeded its useful life and needs to be replaced to assure long term emergency management response to the site. Relocation of the fire station away from Y-12 hazardous material facilities is necessary to ensure that the fire department can respond safely and effectively to all emergencies at Y-12.

Funds appropriated under this data sheet may be used for contracted support services to the Federal Project Director to conduct independent assessments of the planning and execution of this project required by DOE Order 413.3B and to conduct technical reviews of design and construction documents. Construction will not start until CD-3 approval is achieved.

The project will be conducted in accordance with the project management requirements in DOE O 413.3B, Program and Project Management for the Acquisition of Capital Assets.

Funds appropriated under this data sheet may be used for contracted support services to the Federal Project Director and to conduct reviews of design and construction.

[b] The numbers are only estimates and consistent with the high end of the cost ranges

[c] No construction will be performed until the project performance baseline has been validated and CD-3 has been approved.

Financial Schedule

	(dollars in thousands)			
	Appropriations	**Plan**	**Obligations**	**Costs**
Total Estimated Cost (TEC)				
Design				
FY 2018	N/A	5,000	N/A	3,400
FY 2019	N/A	0	N/A	1,600
Total, Design	**N/A**	**5,000**	**N/A**	**5,000**
Construction				
FY 2018	N/A	23,000	N/A	0
FY 2019	N/A	0	N/A	17,300
FY 2020	N/A	0	N/A	5,700
Total, Construction	**N/A**	**23,000**	**N/A**	**23,000**
TEC				
FY 2018	28,000	28,000	28,000	3,400
FY 2019	0	0	0	18,900
FY 2020	0	0	0	5,700
Total, TEC	**28,000**	**28,000**	**28,000**	**28,000**
Other Project Cost (OPC)				
OPC except D&D				
FY 2015	1,160	1,160	1,160	402
FY 2016	458	458	458	311
FY 2017	2,000	2,000	2,000	2,240
FY 2018	1,000	1,000	1,000	900
FY 2019	400	400	400	200
FY 2020	812	812	812	1,000
FY 2021	0	0	0	777
Total, OPC except D&D	**5,830**	**5,830**	**5,830**	**5,830**
Total Project Cost (TPC)				
FY 2015	1,160	1,160	1,160	402
FY 2016	458	458	458	311
FY 2017	2,000	2,000	2,000	2,240
FY 2018	29,000	29,000	29,000	4,300
FY 2019	400	400	400	19,100
FY 2020	812	812	812	6,700
FY 2021	0	0	0	777
Total, TPC	**33,830**	**33,830**	**33,830**	**33,830**

Details of Project Cost Estimate

(dollars in thousands)

	Current Total Estimate	Previous Total Estimate	Original Validated Baseline
Total Estimated Cost (TEC)			
Design			
Design	4,000	N/A	N/A
Contingency	1,000	N/A	N/A
Total, Design	**5,000**	**N/A**	**N/A**
Construction			
Site Work	1,000	N/A	N/A
Equipment	1,000	N/A	N/A
Construction	15,000	N/A	N/A
Federal Support	2,000	N/A	N/A
Contingency	4,000	N/A	N/A
Total, Construction	**23,000**	**N/A**	**N/A**
Total, TEC	**28,000**	**N/A**	**N/A**
Contingency, TEC	**5,000**	**N/A**	**N/A**
Other Project Cost (OPC)			
OPC except D&D			
Conceptual Planning	760	N/A	N/A
Conceptual Design	196	N/A	N/A
Start-Up	891	N/A	N/A
Other OPC Costs	3,147	N/A	N/A
Contingency	836	N/A	N/A
Total, OPC except D&D	**5,830**	**N/A**	**N/A**
Total, OPC	**5,830**	**N/A**	**N/A**
Contingency, OPC	**836**	**N/A**	**N/A**
Total, TPC	**33,830**[a]	**N/A**	**N/A**
Total, Contingency	**5,836**	**N/A**	**N/A**

[a] Although the high end of the approved CD-0 cost range is $45,000, as the cost estimate has been refined, the current high end cost estimate is $33,830. The project is only supported in the FYNSP up to the current high end of the estimate.

Schedule of Appropriation Requests
(dollars in thousands)

Request		Prior Years	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	Outyears	Total
FY 2018	TEC	0	0	28,000	0	0	0	0	0	28,000
	OPC	1,618	2,000	1,000	400	812	0	0	0	5,830
	TPC	1,618	2,000	29,000	400	812	0	0	0	33,830

Related Operations and Maintenance Funding Requirements

Start of Operation or Beneficial Occupancy (fiscal quarter or date)	1Q FY2021
Expected Useful Life (number of years)	30
Expected Future Start of D&D of this capital asset (fiscal quarter)	1Q FY2051

(Related Funding requirements)

(dollars in thousands)

	Annual Costs		Life Cycle Costs	
	Current Total Estimate	Previous Total Estimate	Current Total Estimate	Previous Total Estimate
Operations & Maintenance	235	N/A	7,050	N/A
Utilities	258	N/A	7,750	N/A
Total	493	N/A	14,800	N/A

D&D Information

The new area proposed to be constructed in this project would replace existing facilities; however, the costs of D&D of the facilities that would be replaced are not included in the costs of this construction project. Per the Master Plan for the Y-12 National Security Complex, Building 9710-02 is to be demolished in FY 2029. There is an enduring operation that is unrelated to Fire Department operations that will remain in the facility. The project will utilize 35,000 square feet of previously banked facilities at Y-12 to meet the one-for-one requirement.

	Square Feet
New area being constructed by this project at Y-12…………………………	35,000
Area of D&D in this project at Y-12……………………………………………	0
Area at Y-12 to be transferred, sold, and/or D&D outside the project.	35,000
Area of D&D in this project at other sites………………………………………	0
Area at other sites to be transferred, sold, and/or D&D outside the project ………………………………………………………………………………	0
Total area eliminated ……………………………………………………………	35,000

Acquisition Approach

Federal led utilization of the USACE for the design and construction of the building. Management and operating (M&O) contractor site forces will support the design process and utility connections.

18-D-650 Tritium Production Capability Project
Savannah River Site, Aiken South Carolina
Project is for Design and Construction

Significant Changes and Summary

Significant Changes

This Construction Project Data Sheet (CPDS) is new and does include a new start for the budget year.

Summary

The most recent DOE O 413.3B approved Critical Decision (CD) is CD-0 that was approved on 06/10/2015 with a Total Project Cost (TPC) of $300,000.

Through an extensive Analysis of Alternatives (AoA) process and in compliance with the Government Accountability Office cost and AoA guides, a Preferred Alternative was approved by the Project Management Executive on July 1, 2016. The approved alternative is to build a new DOE Standard 1189-compliant facility to relocate all nuclear processes and a new facility for non-nuclear processes within the Tritium Limited Area to relocate these processes from the H-Area Old Manufacturing Facility. All documents required by DOE Order 413.3B, Change 3 prior to CD-1 approval, have been developed with well-defined cost, schedule, and scope. Consistent with the DOE Guide 413.3-21, a Class 4 estimate for design for the entire project has been completed and documented in the Conceptual Design Report. The cost estimate range for the project is between $261,000 and $499,000, and the CD-4 is scheduled for 4Q FY 2027. In addition, as required by DOE Order 413.3B, a Value Engineering Study has been completed to optimize the value of the project and meet the mission at the lowest life cycle cost. Final project cost and schedule will be determined at CD-2, planned for the end of FY 2022.

A Federal Project Director has been assigned to this project and has approved this CPDS.

The FY 2018 funding will be used to acquire design services.

Critical Milestone History

(fiscal quarter or date)[a]

	CD-0	Conceptual Design Complete	CD-1	CD-2	Final Design Complete	CD-3	D&D Complete	CD-4
FY 2018	06/10/2015	01/28/2017	2QFY 2018	4Q FY 2022	2Q FY 2022	4QFY 2022	N/A	4QFY 2027

	CD-3A
FY 2018	1QFY 2020

CD-3A – Site Preparation – demolishing existing structures, relocating fence, access roads, and utilities to clear and prepare the site for construction of new buildings.

CD-0 – Approve Mission Need for a construction project with a conceptual scope and cost range
Conceptual Design Complete – Estimated/Actual date the conceptual design will be/was complete/d
CD-1 – Approve Design Scope and Project Cost and Schedule Ranges
CD-2 – Approve Project Performance Baseline
Final Design Complete – Estimated/Actual date the project design will be/was complete/d
CD-3A – Approve long lead procurement, dismantlement and removal, and site preparation
CD-3 – Approve Start of Construction
D&D Complete –Completion of D&D work (see Section 9)
CD-4 – Approve Start of Operations or Project Closeout

Project Cost History[b]

	TEC, Design	TEC, Construction	TEC, Total	OPC Except D&D	OPC, D&D	OPC, Total	TPC
FY 2018	76,000	349,000	425,000	74,000	N/A	74,000	499,000

No construction of process facilities will be performed until the project performance baseline has been validated and CD-3 has been approved. A CD-3A request will be made for Long Lead Procurement, Dismantlement and Removal of structures, systems and components, and Site Preparation to reduce project schedule and subsequent cost.

Project Scope and Justification

Scope

The Tritium Production Capability Project will construct two new facilities to relocate tritium and deuterium processes currently in H-Area Old Manufacturing into safe, reliable, modern buildings. The first, hardened facility (estimated at 15,000 sq ft.) will house nuclear equipment processes, and the second (estimated at 5,000 sq. ft.) will house non-nuclear process equipment. To make room for the new buildings, existing warehouses will be demolished and replaced. Additional scope for the project includes project design, safety basis development, and relocation of utilities, fences, and an access road.

Justification

[a] The schedules are only estimates and are consistent with the high end of the schedule ranges.
[b] The costs are only estimates and are consistent with the high end of the cost ranges.

The NNSA Stockpile Stewardship mission and the Tritium-related missions require the specific capability of providing tritium and deuterium-filled reservoirs to the Department of Defense a capability that must be ensured well into the foreseeable future. Some of the critical capabilities required to produce the reservoirs are currently housed in a 60-year-old building. The infrastructure of the building, in H Area Old Manufacturing), has deteriorated and is well beyond expected end-of-life. Critical capabilities are now housed in areas that create a substantial risk to the enduring Tritium Mission. Infrastructure failures have increased the frequency of production, delays and led to increased, safety, security, maintenance and -operating costs.

The project is being conducted in accordance with the project management requirements in DOE O 413.3B, and all appropriate project management requirements for CD-1 will be met before authorizing use of appropriated funds.

Funds appropriated under this data sheet may be used to provide independent assessments of the planning and execution of this project and for contracted support services to the federal project team for oversight and support. Funding specifically appropriated for this project will be used only for Total Estimated Cost (TEC) work.

Financial Schedule

	(dollars in thousands)			
	Appropriations	**Plan**	**Obligations**	**Costs**
Total Estimated Cost (TEC)				
Design				
FY 2018	N/A	6,800	N/A	3,800
FY 2019	N/A	25,505	N/A	15,000
FY 2020	N/A	43,695	N/A	27,000
FY 2021	N/A	0	N/A	12,000
FY 2022	N/A	0	N/A	11,000
FY 2023	N/A	0	N/A	7,200
Total, Design	**N/A**	**76,000**	**N/A**	**76,000**
Construction				
FY 2020	N/A	5,805	N/A	5,000
FY 2021	N/A	13,000	N/A	10,000
FY 2022	N/A	22,000	N/A	3,805
Future Years	N/A	308,195	N/A	330,195
Total, Construction	**N/A**	**349,000**	**N/A**	**349,000**
TEC				
FY 2018	6,800	6,800	6,800	3,800
FY 2019	25,505	25,505	25,505	15,000
FY 2020	49,500	49,500	49,500	32,000
FY 2021	13,000	13,000	13,000	22,000
FY 2022	22,000	22,000	22,000	14,805
Future Years	308,195	308,195	308,195	337,395
Total, TEC	**425,000**	**425,000**	**425,000**	**425,000**
Other Project Cost (OPC)				
OPC except D&D				
FY 2015	2,000	2,000	2,000	2,000
FY 2016	2,100	2,100	2,100	2,100
FY 2017	3,000	3,000	3,000	3,000
FY 2018	3,000	3,000	3,000	3,000
FY 2019	3,000	3,000	3,000	3,000
FY 2020	3,000	3,000	3,000	3,000
FY 2021	3,000	3,000	3,000	3,000
FY 2022	3,000	3,000	3,000	3,000

	(dollars in thousands)			
	Appropriations	**Plan**	**Obligations**	**Costs**
Future Years	51,900	51,900	51,900	51,900
Total, OPC except D&D	**74,000**	**74,000**	**74,000**	**74,000**
D&D				
FY 2018	N/A	N/A	N/A	N/A
Total, D&D	**N/A**	**N/A**	**N/A**	**N/A**
Other Project Cost (OPC)				
FY 2015	2,000	2,000	2,000	2,000
FY 2016	2,100	2,100	2,100	2,100
FY 2017	3,000	3,000	3,000	3,000
FY 2018	3,000	3,000	3,000	3,000
FY 2019	3,000	3,000	3,000	3,000
FY 2020	3,000	3,000	3,000	3,000
FY 2021	3,000	3,000	3,000	3,000
FY 2022	3,000	3,000	3,000	3,000
Future Years	51,900	51,900	51,900	51,900
Total, OPC	**74,000**	**74,000**	**74,000**	**74,000**
Total Project Cost (TPC)				
FY 2015	2,000	2,000	2,000	2,000
FY 2016	2,100	2,100	2,100	2,100
FY 2017	3,000	3,000	3,000	3,000
FY 2018	9,800	9,800	9,800	6,800
FY 2019	28,505	28,505	28,505	18,000
FY 2020	52,500	52,500	52,500	35,000
FY 2021	16,000	16,000	16,000	25,000
FY 2022	25,000	25,000	25,000	17,805
Future Years	360,095	360,095	360,095	389,295
Total, TPC	**499,000**	**499,000**	**499,000**	**499,000**

Details of Project Cost Estimate

(dollars in thousands)

	Current Total Estimate	Previous Total Estimate	Original Validated Baseline
Total Estimated Cost (TEC)			
Design	50,000	N/A	N/A
Safety Basis	4,000	N/A	N/A
Federal Support	3,000	N/A	N/A
Project and Design Management	9,500	N/A	N/A
Contingency	9,500	N/A	N/A
Total, Design	**76,000**	**N/A**	**N/A**
Total, Design Contingency	**9,500**	**N/A**	**N/A**
Construction			
Site Infrastructure	8,500	N/A	N/A
Facility Demolition	2,000	N/A	N/A
Other Construction	270,000	N/A	N/A
Safety Basis Documents	6,000		
Federal Support	8,000	N/A	N/A
M&O Support	5,000		
Contingency	49,500	N/A	N/A
Total, Construction	**349,000**	**N/A**	**N/A**
Total, Construction Contingency	**50,500**	**N/A**	**N/A**
Total, TEC	**425,000**	**N/A**	**N/A**
Contingency, TEC	**60,000**	**N/A**	**N/A**
Other Project Cost (OPC)			
OPC except D&D			
Conceptual Planning	4,900	N/A	N/A
Analysis of Alternative	832	N/A	N/A
Conceptual Design	3,200	N/A	N/A
NEPA & Permit	500	N/A	N/A
Federal Support	3,000	N/A	N/A
Safeguard & Security	1,000	N/A	N/A
ES&H	12,500	N/A	N/A
Contractor Support	3,000	N/A	N/A
Startup	36,500	N/A	N/A
Contingency	8,568	N/A	N/A
Total, OPC except D&D	**74,000**	**N/A**	**N/A**

(dollars in thousands)

	Current Total Estimate	Previous Total Estimate	Original Validated Baseline
D&D	0	N/A	N/A
D&D Contingency	0	N/A	N/A
Total, D&D	**0**	**N/A**	**N/A**
Total, OPC	**74,000**	**N/A**	**N/A**
Contingency, OPC	**8,568**	**N/A**	**N/A**
Total, TPC	**499,000**	**N/A**	**N/A**
Total, Contingency	**68,568**	**N/A**	**N/A**

Schedule of Appropriation Requests

(dollars in thousands)

Request		Prior Years	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	Outyears	Total
FY 2018	TEC	0	0	6,800	25,505	49,500	13,000	22,000	308,195	425,000
	OPC	4,100	3,000	3,000	3,000	3,000	3,000	3,000	51,900	74,000
	TPC	4,100	3,000	9,800	28,505	52,500	16,000	25,000	361,095	499,000

Related Operations and Maintenance Funding Requirements

Start of Operation or Beneficial Occupancy (fiscal quarter or date)	4QFY 2027
Expected Useful Life (number of years)	30
Expected Future Start of D&D of this capital asset (fiscal quarter)	1QFY 2049

(Related Funding requirements)

(dollars in thousands)[c]

	Annual Costs		Life Cycle Costs	
	Current Total Estimate	Previous Total Estimate	Current Total Estimate	Previous Total Estimate
Operations				
Utilities				
Maintenance & Repair				
Total	4,876	N/A	2,478,000	N/A

[a] The CD-1 lifecycle estimate will be broken to the individual sub-category.

Required D&D Information

The new area being constructed in this project is replacing existing facilities, and the costs of D&D of the facilities that are being replaced are included in the costs of this construction project.

Because the existing facility contains tritium, the facility cannot be decommissioned and demolished for another 70 years. The approximate area of warehouses to be demolished to clear the site for the new building is listed here.

D&D Description	Square Feet
1. New area being constructed by this project on the Savannah River Site	20,000 – 30,000
2. Area on the Savannah River Site to be D&D by this project	10,000
3. Area on the Savannah River Site to be transferred, sold, and/or D&D outside the project including area previously “banked”	0
4. Area on other sites to be D&D by this project	0
5. Area on other sites to be transferred, sold, and/or D&D outside the project including area previously “banked”	0
6. Total area eliminated (add boxes 2, 3, 4, and 5)	0

Acquisition Approach

The design and construction, including developing the safety basis documents, could be awarded by the site Management and operating contractor or directly by Federal upon approval of the Acquisition Strategy by the Deputy Administrator for Defense Programs.

17-D-640, U1a Complex Enhancements Project (UCEP)
Nevada National Security Site (NNSS), Mercury, Nevada
Project is for Design and Construction

Significant Changes and Summary

Significant Changes

This Construction Project Data Sheet (CPDS) is an update of the Fiscal Year (FY) 2017 CPDS and does not include a new start for the budget year. Following are the changes from the previous version:

1. Summary and Scope sections were modified to add clarity and to provide a summary of all activities related to the Enhanced Capabilities for Subcritical Experiments subprogram
2. Federal Project Director assignment is indicated
3. CD Milestones and MIE Beneficial Occupancy have been pushed out due to delay in the scheduling of the CD-1 IPR, resolution of IPR recommendations and continuing resolution (CR).

Summary

DOE O 413.3B Critical Decision (CD), *CD-0 Approve Mission Need* was approved on September 25, 2014, for the *"*Enhanced Capabilities for Subcritical Experiments (ECSE) at the Nevada National Security Site, U1a Complex." On November 4, 2015, the U1a 100 and U1a 104 drifts within the U1a Complex at the Nevada National Security Complex were determined to be the only viable location for ECSE. The U1a Complex Enhancement Project (UCEP) has a default Total Project Cost (TPC) of $158.6 million, and a CD-4 *Approve Start of Operations or Project Completion* scheduled for 2QFY 2023. This estimate has not changed since the original estimate, however, is subject to change when the project obtains CD-2 approval and as design is completed for each of the subprojects.

Activities captured under the ECSE subprogram include:

	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022
U1a Complex Enhancement Project (UCEP) Construction in I&O Program (TEC)	**22,100**	**63,000**	**35,000**	**19,900**	**0**
ESCE Program funded Operating Investments in Science					
UCEP OPC	1,000	800	0	0	0
Advanced Sources and Detectors MIE	34,355	30,717	35,120	21,037	20,853
Neutron Diagnosed Subcritical Experiments R&D	10,200	9,000	9,000	9,000	8,200
Readiness Activities	5,200	11,100	8,200	3,000	3,600
Total ECSE	**72,855**	**114,617**	**87,320**	**52,937**	**32,653**

In 2014, the national security laboratories LANL, LLNL, SNL, and the NNSS jointly identified a significant gap in the capabilities available to meet the responsibilities of the science-based SSP. The ECSE subprogram consolidates the advanced multi-pulse radiography machine funded as a Major Item of Equipment (MIE), denoted as Advanced Sources and Detectors (ASD), and supporting science and diagnostic development efforts. UCEP delivers a new underground laboratory that enables new experimental and diagnostic capabilities and an increased operational cadence of subcritical weapons experiments using plutonium. The project provides both mining operations and installation of the necessary supporting structures, systems, and components. Existing U1a Complex orthogonal U1a 100 and U1a 104 drifts will be used to minimize the need for new mining. In FY 2017, UCEP was funded under Infrastructure and Operations. ASD delivers a radiographic diagnostic that is a radiographic system generating the x-ray energies and multi-pulse capability necessary to diagnose late-time dynamics in plutonium experiments. In FY 2017, funding for development of the ASD was appropriated under the Advanced Radiography subprogram. Other consolidated efforts include research and development of a future diagnostic called Neutron Diagnosed Subcritical Experiments (NDSE) and readiness activities.

17-D-640-010: Refuge Station Drift

Constructs the U1a 108 Refuge Station Drift and installs the ventilation upgrades and temporary construction power needed for the Subproject 17-D-640-020 mining activities.

17-D-640-020: Mining and Infrastructure

Constructs the ECSE drifts (U1a 100, 102, 102B, 102D, 102E, 104, 104A, 106, and 107 Drifts) and installs the ventilation, mechanical, electrical, fire protection and life safety, control and diagnostics, and containment plug structures, systems, and components.

Through the NNSA's analysis of alternatives (AoA) process, the U1a Complex at NNSS has been down selected as the location where the experiments employing ECSE diagnostics will be performed. The ECSE AoA Team solicited input from all stakeholders of possible locations for the ECSE capability. All locations except the U1a Complex were eliminated due to environmental and safety regulations and fiscal and schedule constraints.

A Federal Project Director at the appropriate level has been assigned to this project and has approved the CPDS.

Critical Milestone History[a]

17-D-640: Total Project

(fiscal quarter or date)

	CD-0	Conceptual Design Complete	CD-1	CD-2	Final Design Complete	CD-3	D&D Complete	CD-4
FY 2017	09/25/2014	08/13/2015	1Q FY 2017	1Q FY 2019	2Q FY 2019	3QFY 2019	N/A	3Q FY 2022
FY 2018	09/25/2014	08/13/2015	3Q FY 2017	4Q FY 2019	2Q FY 2019	4QFY 2019	N/A	2Q FY 2023

17-D-640-010: Refuge Station Drift

(fiscal quarter or date)

	CD-0	Conceptual Design Complete	CD-1	CD-2	Final Design Complete	CD-3	D&D Complete	CD-4
FY 2017	09/25/2014	08/13/2015	1Q FY 2017	3Q FY 2017	4Q FY 2017	4QFY 2017	N/A	2Q FY 2019
FY 2018	09/25/2014	08/13/2015	3Q FY 2017	2Q FY 2018	1Q FY 2018	2QFY 2018	N/A	3Q FY 2020

17-D-640-020: Mining and Infrastructure

(fiscal quarter or date)

	CD-0	Conceptual Design Complete	CD-1	CD-2	Final Design Complete	CD-3	D&D Complete	CD-4
FY 2017	09/25/2014	08/13/2015	1Q FY 2017	1Q FY 2019	2Q FY2019	3QFY 2019	N/A	3Q FY 2022
FY 2018	09/25/2014	08/13/2015	3Q FY 2017	4Q FY 2019	2Q FY2019	4QFY 2019	N/A	2Q FY 2023

CD-0 – Approve Mission Need for a construction project with a conceptual scope and cost range

[a] The schedules are only estimates and are consistent with the high end of the schedule ranges.

Conceptual Design Complete – Actual date the conceptual design was completed (if applicable)
CD-1 – Approve Alternative Selection and Cost Range
CD-2 – Approve Performance Baseline
Final Design Complete – Estimated/Actual date the project design will be/was complete(d)
CD-3 – Approve Start of Construction/Execution
D&D Complete –Completion of D&D work (see Section 9)
CD-4 – Approve Start of Operations or Project Completion
PB – Indicates the Performance Baseline

A single set of documentation will be submitted for CD-1. Subsequently, separate documentation will be submitted for combined CD-2/3 for each subproject. The dates listed above do not include schedule contingency.

Project Cost History

17-D-640: Total Project

	TEC, Design	TEC, Construction	TEC, Total	OPC Except D&D	OPC, D&D	OPC, Total	TPC
FY 2017	14,200	137,300	151,500	7,109	N/A	7,109	158,609
FY 2018	14,200	137,300	151,500	7,109	N/A	7,109	158,609

17-D-640-010: Refuge Station Drift

	TEC, Design	TEC, Construction	TEC, Total	OPC Except D&D	OPC, D&D	OPC, Total	TPC
FY 2017	2,700	23,940	26,640	981	N/A	981	27,621
FY 2018	2,700	23,940	26,640	981	N/A	981	27,621

17-D-640-020: Mining and Infrastructure

	TEC, Design	TEC, Construction	TEC, Total	OPC Except D&D	OPC, D&D	OPC, Total	TPC
FY 2017	11,500	113,360	124,860	6,128	N/A	6,128	130,988
FY 2018	11,500	113,360	124,860	6,128	N/A	6,128	130,988

Project Scope and Justification

Scope

UCEP will perform mining and provide the supporting structures, systems and components necessary to deploy the large MIE diagnostic systems and experiments. Existing U1a Complex orthogonal U1a 100 and U1a 104 drifts will be used to minimize the need for new mining.

17-D-640-010 includes the design, fabrication, construction, installation and commissioning of the underground areas and systems in the U1a Complex to provide a refuge station, adequate ventilation, and construction power for the ensuing subproject 17-D-640-020. This subproject is required to support any significant construction activity in the eastern portion of the U1a Complex. It is a relatively simple and straightforward project that can be designed and completed separately from the other subproject that will directly support the MIE installation.

17-D-640-020 includes the design, fabrication, construction, installation and commissioning of the ECSE Area and systems to provide MIE diagnostic/detector alcove drifts and mechanical equipment drifts. The project underground scope includes an experimental room with containment plugs for experiment execution, process control system, safety interlock system, diagnostic clean rooms and diagnostic infrastructure, and ancillary systems (overhead handling systems, power, cooling, ventilation, process water and oil, instrument air, and shielding).

Justification

The enhancements to the U1a Complex included in this Line Item will provide the drifts and the supporting structures, systems, and components necessary for the deployment of the MIEs to diagnose the subcritical hydrodynamic integrated weapons experiments using plutonium.

NNSA plans long-term investments supporting plutonium science at the NNSS. NNSS is the only site in the United States for experiments combining high explosives and plutonium, a core capability for NNSA's Stockpile Stewardship Program in 50 U.S. Code § 2521.

Funds appropriated under this data sheet may be used for contracted support services to the Federal Program Manager and the Federal Project Director to conduct independent assessments of the planning and execution of this project required by DOE O 413.3B and to conduct technical reviews of design and construction documents.

The project is being conducted in accordance with the project management requirements in DOE O 413.3B, Program and Project Management for the Acquisition of Capital Assets. As allowed by DOE O 413.3B, work will be phased to improve overall efficiency.

OPCs are funded out of the Enhanced Capabilities for Subcritical Experiments subprogram within Research Development Test & Evaluation (RDT&E), Science program.

Financial Schedule

17-D-640-010: Refuge Station Drift

(dollars in thousands)

	Appropriations	Allocations	Obligations	Costs
Total Estimated Cost (TEC)				
Design				
FY 2017	N/A	2,700	N/A	2,700
FY 2018	N/A	0	N/A	0
FY 2019	N/A	0	N/A	0
FY 2020	N/A	0	N/A	0
FY 2021	N/A	0	N/A	0
Total, Design	**N/A**	**2,700**	**N/A**	**2,700**
Construction				
FY 2017	N/A	8,800	N/A	4,000
FY 2018	N/A	15,140	N/A	12,800
FY 2019	N/A	0	N/A	7,140
FY 2020	N/A	0	N/A	0
Total, Construction	**N/A**	**23,940**	**N/A**	**23,940**
TEC				
FY 2017	N/A	11,500	N/A	6,700
FY 2018	N/A	15,140	N/A	12,800
FY 2019	N/A	0	N/A	7,140
FY 2020	N/A	0	N/A	0
FY 2021	N/A	0	N/A	0
Total, TEC	**N/A**	**26,640**	**N/A**	**26,640**

	(dollars in thousands)			
	Appropriations	Allocations	Obligations	Costs
OPC except D&D				
FY 2015	N/A	281	N/A	281
FY 2016	N/A	700	N/A	700
FY 2017	N/A	0	N/A	0
FY 2018	N/A	0	N/A	0
FY 2019	N/A	0	N/A	0
Total, OPC except D&D	**N/A**	**981**	**N/A**	**981**
Total Project Cost (TPC)				
FY 2015	N/A	281	N/A	281
FY 2016	N/A	700	N/A	700
FY 2017	N/A	11,500	N/A	6,700
FY 2018	N/A	15,140	N/A	12,800
FY 2019	N/A	0	N/A	7,140
FY 2020	N/A	0	N/A	0
FY 2021	N/A	0	N/A	0
Total, TPC	**N/A**	**27,621**	**N/A**	**27,621**

17-D-640-020: Mining and Infrastructure

	(dollars in thousands)			
	Appropriations	Allocations	Obligations	Costs
Total Estimated Cost (TEC)				
Design				
FY 2017	N/A	0	N/A	0
FY 2018	N/A	6,960	N/A	6,100
FY 2019	N/A	4,540	N/A	5,400
FY 2020	N/A	0	N/A	0
FY 2021	N/A	0	N/A	0
FY 2022	N/A	0	N/A	0
FY 2023	N/A	0	N/A	0
Total, Design	**N/A**	**11,500**	**N/A**	**11,500**
Construction				
FY 2019	N/A	58,460	N/A	29,000
FY 2020	N/A	35,000	N/A	43,750
FY 2021	N/A	19,900	N/A	24,610
FY 2022	N/A	0	N/A	12,000
FY 2023	N/A	0	N/A	4,000
Total, Construction	**N/A**	**113,360**	**N/A**	**113,360**
TEC				
FY 2017	N/A	0	N/A	0
FY 2018	N/A	6,960	N/A	6,100
FY 2019	N/A	63,000	N/A	34,400
FY 2020	N/A	35,000	N/A	43,750
FY 2021	N/A	19,900	N/A	24,610
FY 2022	N/A	0	N/A	12,000
FY 2023	N/A	0	N/A	4,000
Total, TEC	**N/A**	**124,860**	**N/A**	**124,860**

(dollars in thousands)

	Appropriations	Allocations	Obligations	Costs
Other Project Cost (OPC)				
OPC except D&D				
Previous Years	N/A	2,628	N/A	2,128
FY 2017	N/A	1,700	N/A	1,700
FY 2018	N/A	1,000	N/A	1,000
FY 2019	N/A	800	N/A	1,300
FY 2020	N/A	0	N/A	0
Total, OPC except D&D	**N/A**	**6,128**	**N/A**	**6,128**
Total Project Cost (TPC)				
Previous Years	N/A	2,628	N/A	2,128
FY 2017	N/A	1,700	N/A	1,700
FY 2018	N/A	7,960	N/A	7,100
FY 2019	N/A	63,800	N/A	35,700
FY 2020	N/A	35,000	N/A	43,750
FY 2021	N/A	19,900	N/A	24,610
FY 2022	N/A	0	N/A	12,000
FY 2023	N/A	0	N/A	4,000
Total, TPC	**N/A**	**130,988**	**N/A**	**130,988**

Total Project

(dollars in thousands)

	Appropriations	Allocations	Obligations	Costs
Total Estimated Cost (TEC)				
Design				
FY 2017	N/A	2,700	2,700	2,700
FY 2018	N/A	6,960	6,960	6,100
FY 2019	N/A	4,540	4,540	5,400
FY 2020	N/A	0	0	0
FY 2021	N/A	0	0	0
FY 2022	N/A	0	0	0
FY 2023	N/A	0	0	0
Total, Design	**N/A**	**14,200**	**14,200**	**14,200**
Construction				
FY 2017	N/A	8,800	8,800	4,000
FY 2018	N/A	15,140	15,140	12,800
FY 2019	N/A	58,460	58,460	36,140
FY 2020	N/A	35,000	35,000	43,750
FY 2021	N/A	19,900	19,900	24,610
FY 2022	N/A	0	0	12,000
FY 2023	N/A	0	0	4,000
Total, Construction	**N/A**	**137,300**	**137,300**	**137,300**

(dollars in thousands)

	Appropriations	Allocations	Obligations	Costs
TEC				
FY 2017	11,500	11,500	11,500	6,700
FY 2018	22,100	22,100	22,100	18,900
FY 2019	63,000	63,000	63,000	41,540
FY 2020	35,000	35,000	35,000	43,750
FY 2021	19,900	19,900	19,900	24,610
FY 2022	0	0	0	12,000
FY 2023	0	0	0	4,000
Total, TEC	**151,500**	**151,500**	**151,500**	**151,500**
Other Project Cost (OPC)				
OPC except D&D				
Previous Years	3,609	3,609	3,609	3,609
FY 2017	1,700	1,700	1,700	1,700
FY 2018	1,000	1,000	1,000	1,000
FY 2019	800	800	800	800
FY 2020	0	0	0	0
Total, OPC except D&D	**7,109**	**7,109**	**7,109**	**7,109**
Total Project Cost (TPC)				
Previous Years	3,609	3,609	3,609	3,609
FY 2017	13,200	13,200	13,200	8,400
FY 2018	23,100	23,100	23,100	19,900
FY 2019	63,800	63,800	63,800	42,340
FY 2020	35,000	35,000	35,000	43,750
FY 2021	19,900	19,900	19,900	24,610
FY 2022	0	0	0	12,000
FY 2023	0	0	0	4,000
Total, TPC	**158,609**	**158,609**	**158,609**	**158,609**

Details of Project Cost and Estimate

17-D-640-010: Refuge Station Drift

(dollars in thousands)

	Current Total Estimate	Previous Total Estimate	Original Validated Baseline
Total Estimated Cost (TEC)			
Design	1,800	1,800	N/A
Project Management	500	500	N/A
Contingency	400	400	N/A
Total, Design	**2,700**	**2,700**	**N/A**
Construction			
Construction	18,340	18,340	N/A
Construction Mgmt	900	900	N/A
Contingency	4,700	4,700	N/A
Total, Construction	**23,940**	**23,940**	**N/A**
Total, TEC	**26,640**	**26,640**	**N/A**
Contingency, TEC	**5,100**	**5,100**	**N/A**
Other Project Cost (OPC)			
OPC except D&D			
Conceptual Planning	200	200	N/A
Conceptual Design	281	281	N/A
Other OPCs including AB, Security, and PM Reviews	400	400	
Contingency	100	100	N/A
Total, OPC except D&D	**981**	**981**	**N/A**
Contingency, OPC except D&D	**100**	**100**	**N/A**
D&D	N/A	N/A	N/A
Contingency	N/A	N/A	N/A
Total, D&D	**N/A**	**N/A**	**N/A**
Total, OPC	**981**	**981**	**N/A**
Contingency, OPC	**100**	**100**	**N/A**
Total, TPC	**27,621**	**27,621**	**N/A**
Total, Contingency	**5,200**	**5,200**	**N/A**

17-D-640-020: Mining and Infrastructure

(dollars in thousands)

	Current Total Estimate	Previous Total Estimate	Original Validated Baseline
Total Estimated Cost (TEC)			
Design	7,800	7,800	N/A
Project Management	1,900	1,900	N/A
Contingency	1,800	1,800	N/A
Total, Design	**11,500**	**11,500**	**N/A**
Construction			
Construction	84,500	84,500	N/A
Construction Mgmt	5,440	5,440	N/A
Contingency	23,420	23,420	N/A
Total, Construction	**113,360**	**113,360**	**N/A**
Total, TEC	**124,860**	**124,860**	**N/A**
Contingency, TEC	**25,220**	**25,220**	**N/A**
Other Project Cost (OPC)			
OPC except D&D			
Conceptual Planning	300	300	N/A
Conceptual Design	728	728	N/A
Other OPCs including AB, Security, and PM Reviews	4,800	4,800	
Contingency	300	300	N/A
Total, OPC except D&D	**6,128**	**6,128**	**N/A**
Contingency, OPC except D&D	**300**	**300**	
D&D	N/A	N/A	N/A
Contingency	N/A	N/A	N/A
Total, D&D	**N/A**	**N/A**	**N/A**
Total, OPC	**6,128**	**6,128**	**N/A**
Contingency, OPC	**300**	**300**	**N/A**
Total, TPC	**130,988**	**130,988**	**N/A**
Total, Contingency	**25,520**	**25,520**	**N/A**

17-D-640: Total Project

(dollars in thousands)

	Current Total Estimate	Previous Total Estimate	Original Validated Baseline
Total Estimated Cost (TEC)			
Design	9,600	9,600	N/A
Project Management	2,400	2,400	N/A
Contingency	2,200	2,200	N/A
Total, Design	**14,200**	**14,200**	**N/A**
Construction			
Construction	102,840	102,840	N/A
Construction Mgmt	6,340	6,340	N/A
Contingency	28,120	28,120	N/A
Total, Construction	**137,300**	**137,300**	**N/A**
Total, TEC	**151,500**	**151,500**	**N/A**
Contingency, TEC	**30,320**	**30,320**	**N/A**
Other Project Cost (OPC)			
OPC except D&D			
Conceptual Planning	500	500	N/A
Conceptual Design	1,009	1,009	N/A
Other OPCs including AB, Security, and PM Reviews	5,200	5,200	
Contingency	400	400	N/A
Total, OPC except D&D	**7,109**	**7,109**	**N/A**
Contingency, OPC except D&D	**400**	**400**	
D&D	N/A	N/A	N/A
Contingency	N/A	N/A	N/A
Total, D&D	**N/A**	**N/A**	**N/A**
Total, OPC	**7,109**	**7,109**	**N/A**
Contingency, OPC	400	400	N/A
Total, TPC	**158,609**	**158,609**	**N/A**
Total, Contingency	**30,720**	**30,720**	**N/A**

Schedule of Appropriation Requests

(dollars in thousands)

Request		Prior Years	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	Outyears	Total
FY 2017	TEC	0	11,500	22,100	63,000	35,000	19,900	0	0	151,500
	OPC	3,609	1,700	1,000	800	0	0	0	0	7,109
	TPC	3,609	13,200	23,100	63,800	35,000	19,900	0	0	158,609
FY 2018	TEC	0	11,500	22,100	63,000	35,000	19,900	0	0	151,500
	OPC	3,609	1,700	1,000	800	0	0	0	0	7,109
	TPC	3,609	13,200	23,100	63,800	35,000	19,900	0	0	158,609

Related Operations and Maintenance Funding Requirements

Beneficial Occupancy for Installation of MIE (fiscal quarter or date)	3QFY 2021
Expected Useful Life (number of years)	30
Expected Future Start of D&D of this capital asset (fiscal quarter)	3QFY 2054

(Related Funding requirements)

(dollars in thousands)

	Annual Costs		Life Cycle Costs	
	Current Total Estimate	**Previous Total Estimate**	**Current Total Estimate**	**Previous Total Estimate**
Operations	28,666	N/A	860,000	N/A
Utilities	1,792	N/A	53,750	N/A
Maintenance & Repair	5,375	N/A	161,250	N/A
Total	35,833	N/A	1,075,000	N/A

D&D Information

The new area being constructed in this project is not replacing existing facilities.

Acquisition Approach

The project will be managed by the NNSS Management and Operating (M&O) contractor, because operations are within the U1a Complex, which is an underground facility with limited access. Design and construction of the underground modifications will be performed by the NNSS M&O contractor.

17-D-630, Expand Electrical Distribution System
Lawrence Livermore National Laboratory, Livermore, California
Project is for Design and Construction

Significant Changes and Summary

Significant Changes

This Construction Project Data Sheet (CPDS) is an update of the Fiscal Year (FY) 2017 CPDS and does not include a new start for the budget year.

An additional $6,000 in Total Estimated Cost (TEC) and $400 in Other Project Costs have been added based on the updated cost and schedule estimate in preparation for setting the project baseline. Increases also reflect escalation of construction costs due to a delay from the previously planned start in FY 2017 and longer projected execution schedule for CD-4 in FY 2021.

Summary

The most recent DOE O 413.3B approved Critical Decision (CD) is CD-1, approved on February 10, 2012, with a preliminary cost range of $33,400 to $55,400 and CD-4 of 4Q FY 2016. This scope was previously requested under 13-D-301, Electrical Infrastructure Upgrades, a joint project that included Los Alamos National Laboratory (LANL) scope; the project was subsequently split into separate requests. The preliminary cost range at CD-1 for the Lawrence Livermore National Laboratory (LLNL) scope was $16,500 to $27,400. The start of this project has been pushed from second quarter FY 2017 to fourth quarter FY 2017.

A Federal Project Director had been assigned to this project but a replacement Federal Project Director is in the process of being assigned. This CPDS has been reviewed and approved by the acting Federal Project Director.

This project will expand the electrical distribution systems at LLNL along the east side of the site. A new electrical connection will also be provided to the Sandia-California site. It will supplement the existing distribution system with new 15kV underground electrical distribution systems, load grid switchgear, and connection for additional future electrical supply.

Funding requested in FY 2018 will be used for construction and contingency under a fixed price design build contract.

Critical Milestone History[a]

(fiscal quarter or date)

	CD-0	Conceptual Design Complete	CD-1	CD-2	Final Design Complete	CD-3	D&D Complete	CD-4
FY 2017	08/13/2011	11/28/2011	02/10/2012	2Q FY 2017	1Q FY 2018	2Q FY 2017	N/A	4Q FY 2019
FY 2018	08/13/2011	11/28/2011	02/10/2012	4Q FY 2017	1Q FY 2019	4Q FY 2017	N/A	1Q FY 2021

CD-0 – Approve Mission Need
Conceptual Design Complete – Actual date the conceptual design was completed
CD-1 – Approve Alternative Selection and Cost Range

[a] The schedules are only estimates and consistent with the high end of the schedule ranges.

CD-2 – Approve Performance Baseline
Final Design Complete – Estimated/Actual date the project design will be completed
CD-3 – Approve Start of Construction/Execution
D&D Complete –Completion of D&D work (see Section 9)
CD-4 – Approve Start of Operations or Project Completion
PB – Indicates the Performance Baseline

Project Cost History[a]
(dollars in thousands)

	TEC, Design	TEC, Construction	TEC, Total	OPC Except D&D	OPC, D&D	OPC, Total	TPC
FY 2017	2,000	23,000	25,000	2,400	N/A	2,400	27,400
FY 2018	2,300	28,700	31,000	2,800	N/A	2,800	33,800

Project Scope and Justification

Scope

The project designs and constructs an expansion of the 15kV electrical distribution systems at LLNL along the east side of the site with underground duct bank and load grid switchgear. It will supplement the existing distribution system with new 15kV underground electrical distribution systems, load grid switchgear, and connection for additional future electrical supply. A new 15kV connection from the Western Livermore Substation will be provided to the Sandia-California site.

Justification

The current electrical distribution system at LLNL is not configured to provide reliable electrical power. This project will address the most urgent electrical infrastructure needs by providing a reliable alternate electrical feed to mission critical facilities at LLNL and Sandia-California. Consistent with the long-term mission requirement, this capability must have a minimum service life of 40 years to align its availability with planned strategic mission timeframes. Without this upgrade, certain mission-critical facilities at LLNL and Sandia-California will continue to operate with a single point of failure.

In addition, this upgrade will provide the versatility to adapt to increasingly stringent safety, security, and environmental regulations, and new technology. Inherent in this capability is the minimization (to the greatest extent possible) of environmental impacts and construction waste produced as a result of this upgrade.

The project started a risk assessment during the early planning and initial concept phase. A risk-adjusted cost estimate and a plan to eliminate, mitigate or manage risk has been developed and will be maintained through-out the life of the project.

The project is being conducted in accordance with the project management requirements in DOE O 413.3B, Program and Project Management for the Acquisition of Capital Assets.

[a] No construction, excluding for approved long lead procurement, will be performed until the project performance baseline has been validated and CD-3 has been approved.

Financial Schedule

	(dollars in thousands)			
	Appropriations	**Plan**	**Obligations**	**Costs**
Total Estimated Cost (TEC)				
Design				
FY 2017	N/A	2,300	N/A	500
FY 2018	N/A	0	N/A	1,500
FY 2019	N/A	0	N/A	300
Total, Design	**N/A**	**2,300**	**N/A**	**2,300**
Construction				
FY 2017	N/A	22,700	N/A	0
FY 2018	N/A	6,000	N/A	4,000
FY 2019	N/A	0	N/A	10,000
FY 2020	N/A	0	N/A	10,300
FY 2021	N/A	0	N/A	4,400
Total, Construction	**N/A**	**28,700**	**N/A**	**28,700**
TEC				
FY 2017	25,000	25,000	25,000	500
FY 2018	6,000	6,000	6,000	5,500
FY 2019	0	0	0	10,300
FY 2020	0	0	0	10,300
FY 2021	0	0	0	4,400
Total, TEC	**31,000**	**31,000**	**31,000**	**31,000**
Other Project Cost (OPC)				
OPC except D&D				
FY 2011	250	250	250	250
FY 2012	750	750	750	750
FY 2013	0	0	0	0
FY 2014	0	0	0	0
FY 2015	0	0	0	0
FY 2016	400	400	400	91
FY 2017	200	200	200	470
FY 2018	400	400	400	400
FY 2019	200	200	200	200
FY 2020	200	200	200	200
FY 2021	400	400	400	439
Total, OPC except D&D	**2,800**	**2,800**	**2,800**	**2,800**

	(dollars in thousands)			
	Appropriations	**Plan**	**Obligations**	**Costs**
Total Project Cost (TPC)				
FY 2011	250	250	250	250
FY 2012	750	750	750	750
FY 2013	0	0	0	0
FY 2014	0	0	0	0
FY 2015	0	0	0	0
FY 2016	400	400	400	91
FY 2017	25,200	25,200	25,200	970
FY 2018	6,400	6,400	6,400	5,900
FY 2019	200	200	200	10,500
FY 2020	200	200	200	10,500
FY 2021	400	400	400	4,839
Total, TPC	**33,800**	**33,800**	**33,800**	**33,800**

Details of Project Cost Estimate

	(dollars in thousands)		
	Current Total Estimate	**Previous Total Estimate**	**Original Validated Baseline**
Total Estimated Cost (TEC)			
Design			
Design	1,700	1,500	N/A
Contingency	600	500	N/A
Total, Design	**2,300**	**2,000**	**N/A**
Construction			
Site Work	0	500	N/A
Construction	25,500	20,000	N/A
FPD Support	0	0	
Contingency	3,200	2,500	N/A
Total, Construction	**28,700**	**23,000**	**N/A**
Total, TEC	**31,000**	**25,000**	**N/A**
Contingency, TEC	**3,800**	**3,000**	**N/A**
Other Project Cost (OPC)			
OPC except D&D			
Conceptual Planning	250	250	N/A
Conceptual Design	850	750	N/A
Hot startup	500	500	N/A
Other OPC Costs	800	500	N/A
Contingency	400	400	N/A
Total, OPC except D&D	**2,800**	**2,400**	**N/A**
D&D			
D&D	N/A	N/A	N/A
Total, D&D	**N/A**	**N/A**	**N/A**
Total, OPC	**2,800**	**2,400**	**N/A**
Contingency, OPC	**400**	**400**	**N/A**
Total, TPC	**33,800**	**27,400**	**N/A**
Total, Contingency	**4,200**	**3,400**	**N/A**

Schedule of Appropriation Requests

(dollars in thousands)

Request		Prior Years	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	Outyears	Total
FY 2017	TEC	0	25,000	0	0	0	0	0	0	25,000
	OPC	1,400	100	200	500	200	0	0	0	2,400
	TPC	1,400	25,100	200	500	200	0	0	0	27,400
FY 2018	TEC	0	25,000	6,000	0	0	0	0	0	31,000
	OPC	1,400	200	400	200	200	400	0	0	2,800
	TPC	1,400	25,200	6,400	200	200	400	0	0	33,800

Related Operations and Maintenance Funding Requirements

Start of Operation or Beneficial Occupancy (fiscal quarter or date)	1Q FY 2021
Expected Useful Life (number of years)	40
Expected Future Start of D&D of this capital asset (fiscal quarter)	4Q FY 2061

(Related Funding requirements)

(dollars in thousands)

	Annual Costs		Life Cycle Costs	
	Current Total Estimate	**Previous Total Estimate**	**Current Total Estimate**	**Previous Total Estimate**
Operations	500	500	20,000	20,000
Utilities	N/A	N/A	N/A	N/A
Maintenance & Repair	500	500	20,000	20,000
Total	**1,000**	**1,000**	**40,000**	**40,000**

D&D Information

There is no new area being constructed in this project.

Acquisition Approach

Design and construction contracts will be acquired through open competition. Selection will be based on best value to the government and awards will be on firm-fixed price delivery.

16-D-515, Albuquerque Complex Project
NNSA Albuquerque Complex, Albuquerque, New Mexico
Project is for Design and Construction

Significant Changes and Summary

Significant Changes

This Construction Project Data Sheet (CPDS) is an update of the Fiscal Year (FY) 2017 CPDS and does not include a new start for the budget year.

The Project plans to request a combined Critical Decision 2/3 (CD-2/3) in the second quarter of FY 2018 for the New Facility Subproject. Construction will start in FY 2018. CD-2/3 for the New Facility Subproject was delayed as a result of scoping decisions and a mandatory United State Army Corps of Engineers (USACE) procurement review not previously factored into the project schedule. At the time of the previous budget submission, there was not a determination the USACE would be utilized to manage the project. The square footage increased from 279,000-295,000 gross square feet (GSF) to approximately 333,000 GSF from the FY 2017 CPDS. The DOE Office of Project Management and Oversight Assessment performed an Independent Cost Estimate (ICE) in FY 2016 resulting in a total project cost (TPC) range of $199,000 – $247,000. The project will be executed as two sub-projects: one for construction of the new facility and one for D&D of the old Albuquerque Complex.

The FY 2018 CPDS is consistent with 60% design estimates. Additionally, other project cost (OPC) estimates now include costs for Enterprise Construction Management support, independent cost estimates, external independent reviews, and annual program reviews.

Summary

The most recent DOE O 413.3B approved Critical Decision (CD) is CD-1 and was approved on February 3, 2016 with an estimated CD-4 of FY 2021.

A Federal Project Director has been assigned to this project.

This project will design and construct a new facility on DOE property in Albuquerque, New Mexico adjacent to the Kirtland Air Force Base east perimeter fence on Eubank Avenue. This project replaces inadequate facilities with LEED Gold buildings. This project also provides for D&D of approximately 312,000 GSF of existing facilities, with 15,499 GSF to be returned to the Air Force.

Critical Milestone History[a]

(fiscal quarter or date)

	CD-0	Conceptual Design Complete	CD-1	CD-2	Final Design Complete	CD-3	D&D Complete	CD-4
FY 2017	09/22/2011	12/18/2015	02/03/2016	2Q FY 2017	4Q FY 2017	2Q FY 2017	1Q FY 2021	2Q FY 2021
FY 2018	09/22/2011	12/18/2015	02/03/2016	1Q FY 2020	1Q FY 2018	2Q FY 2022	2Q FY 2023	3Q FY 2023

[a] The schedules are only estimates and consistent with the high end of the schedule ranges.

New Facility Subproject (16-D-515-01)

	CD-0	Conceptual Design Complete	CD-1	CD-2	Final Design Complete	CD-3	D&D Complete	CD-4
FY 2018	09/22/2011	12/18/2015	02/03/2016	2Q FY 2018	1Q FY 2018	2Q FY 2018	N/A	1Q FY 2022

D&D Subproject (16-D-515-02)

	CD-0	Conceptual Design Complete	CD-1	CD-2	Final Design Complete	CD-3	D&D Complete	CD-4
FY 2018	09/22/2011	12/18/2015	02/03/2016	1Q FY 2020	N/A	2Q FY 2022	2Q FY 2023	3Q FY 2023

CD-0 – Approve Mission Need
Conceptual Design Complete – Actual date the conceptual design was completed (if applicable)
CD-1 – Approve Alternative Selection and Cost Range
CD-2 – Approve Performance Baseline
Final Design Complete – Estimated/Actual date the project design will be/was complete(d)
CD-3 – Approve Start of Construction/Execution
D&D Complete – Completion of D&D work (see Section 9)
CD-4 – Approve Start of Operations or Project Completion
PB – Indicates the Performance Baseline

Project Cost History[a]

(dollars in thousands)

	TEC, Design	TEC, Construction	TEC, Total	OPC Except D&D	OPC, D&D	OPC, Total	TPC
FY 2017	14,700	153,900	168,600	3,690	24,210	27,900	196,500
FY 2018	11,000	158,000	169,000	5,700	27,300	33,000	202,000

New Facility Subproject (16-D-515-01)

(dollars in thousands)

	TEC, Design	TEC, Construction	TEC, Total	OPC Except D&D	OPC, D&D	OPC, Total	TPC
FY 2018	11,000	158,000	169,000	5,700	N/A	5,700	174,700

D&D Subproject (16-D-515-02)

(dollars in thousands)

	TEC, Design	TEC, Construction	TEC, Total	OPC Except D&D	OPC, D&D	OPC, Total	TPC
FY 2018	N/A	N/A	N/A	N/A	27,300	27,300	27,300

[a] No construction will be performed until the project performance baseline has been validated and CD-3 has been approved.

Project Scope and Justification

Scope

This project will design and construct approximately 333,000 square feet (SF) of office space for approximately 1,200 employees. The project will include approximately 22,000 square feet of vault type rooms and/or Sensitive Compartmented Information Facility (SCIF) space. The project will include an access road to the site on leased land from Kirtland Air Force Base. The building will be constructed on DOE property in Albuquerque, New Mexico adjacent to the Kirtland Air Force Base east perimeter fence on Eubank Avenue. Upon completion of the building, the perimeter fence will be relocated to encompass the new building and parking lot. The project includes the cost for moves, decommissioning, abatement and demolition of approximately 312,000 GSF of existing buildings. Two buildings (15,499 GSF) which are leased from the Air Force will be returned. The new buildings will be designed to LEED Gold Standards.

The Albuquerque Complex Project consists of the following subprojects:

New Facility Subproject (16-D-515-01): The New Facility subproject covers all scope of the project, with the exception of the D&D of the current Albuquerque Complex. This includes planning, design and construction of the new building, access road and perimeter.

D&D Subproject (16-D-515-02): The D&D subproject will decommission, abate, and demolish approximately 312,000 GSF of existing buildings. Two buildings (15,499 GSF) leased from the Air Force will be prepared for return to the Air Force.

Justification

The NNSA Albuquerque Complex provides vital services to the agency. The Albuquerque Complex houses multiple organizations that fulfill unique and essential roles within the nuclear weapons enterprise by providing programmatic, technical support, legal, security, procurement, human resources, business and administrative functions that directly support the NNSA national security mission. The proximity of the Albuquerque Complex to two NNSA national laboratories and the Air Force Nuclear Weapons Center on Kirtland Air Force Base makes it an ideal location for an NNSA field installation. The Albuquerque Complex has supported the DOE/NNSA from this location for over 50 years, and there are no plans to eliminate or reduce the size or function of this office in the near future. NNSA has a long-term commitment at this installation, and it will remain the primary field support office for NNSA.

The NNSA Albuquerque Office currently occupies 327,428 GSF in 23 buildings. The main office buildings were originally constructed in 1951 as enlisted barracks. The existing complex is beyond its designed life and does not meet NNSA's needs. The four-story barracks facilities are 64-year-old, unreinforced concrete block buildings and do not meet requirements under Executive Order 12941, *Seismic Safety of Existing Federally Owned or leased Buildings*. In 2005, a building assessment stated, "The building structure has violated the Uniform Building Code for the last 15 years. The structure type is prohibited in nearly all seismic zones."[a] The Albuquerque Complex has a deferred maintenance backlog of $39 million, not including necessary seismic upgrades.

The project is being conducted in accordance with the project management requirements in DOE O 413.3B, Program and Project Management for the Acquisition of Capital Assets.

Funds appropriated under this data sheet may be used for contracted support services to the Federal Project Director and to conduct reviews of design and construction.

[a] Infrastructure Condition Assessment Survey and Analysis, National Nuclear Security Administration Service Center and Energy Training Center, Albuquerque, NM, Lopez Engineering, Inc., November 2005.

Financial Schedule

New Facility Subproject (16-D-515-01)

	(dollars in thousands)			
	Appropriations	**Plan**	**Obligations**	**Costs**
Total Estimated Cost (TEC)				
Design				
FY 2016	N/A	8,000	N/A	3,247
FY 2017	N/A	3,000	N/A	6,770
FY 2018	N/A	0	N/A	983
Total, Design	**N/A**	**11,000**	**N/A**	**11,000**
Construction				
FY 2017	N/A	12,047	N/A	0
FY 2018	N/A	98,000	N/A	54,000
FY 2019	N/A	47,953	N/A	84,000
FY 2020	N/A	0	N/A	12,000
FY 2021	N/A	0	N/A	8,000
Total, Construction	**N/A**	**158,000**	**N/A**	**158,000**
TEC				
FY 2016	N/A	8,000	N/A	3,247
FY 2017	N/A	15,047	N/A	6,770
FY 2018	N/A	98,000	N/A	54,983
FY 2019	N/A	47,953	N/A	84,000
FY 2020	N/A	0	N/A	12,000
FY 2021	N/A	0	N/A	8,000
Total, TEC	**N/A**	**169,000**	**N/A**	**169,000**
Other Project Cost (OPC)				
OPC except D&D				
FY 2015[a]	N/A	250	N/A	223
FY 2016	N/A	2,456	N/A	994
FY 2017	N/A	0	N/A	900
FY 2018	N/A	550	N/A	600
FY 2019	N/A	600	N/A	500
FY 2020	N/A	600	N/A	700
FY 2021	N/A	700	N/A	700
FY 2022	N/A	544	N/A	600
FY 2023	N/A	0	N/A	483
Total, OPC except D&D	**N/A**	**5,700**	**N/A**	**5,700**
D&D				
FY 2020	N/A	N/A	N/A	N/A

[a] OPCs in FY 2015 were funded from the NNSA Federal Salaries and Expenses appropriation. FY 2015 costs in the FY 2017 CPDS were incorrect and have been revised.

(dollars in thousands)

	Appropriations	Plan	Obligations	Costs
FY 2021	N/A	N/A	N/A	N/A
Total, D&D	**N/A**	**N/A**	**N/A**	**N/A**
OPC				
FY 2015	N/A	250	N/A	223
FY 2016	N/A	2,456	N/A	994
FY 2017	N/A	0	N/A	900
FY 2018	N/A	550	N/A	600
FY 2019	N/A	600	N/A	500
FY 2020	N/A	600	N/A	700
FY 2021	N/A	700	N/A	700
FY 2022	N/A	544	N/A	600
FY 2023	N/A	0	N/A	483
Total, OPC	**N/A**	**5,700**	**N/A**	**5,700**
Total Project Cost (TPC)				
FY 2015	N/A	250	N/A	223
FY 2016	N/A	10,456	N/A	4,241
FY 2017	N/A	15,047	N/A	7,670
FY 2018	N/A	98,550	N/A	55,583
FY 2019	N/A	48,553	N/A	84,500
FY 2020	N/A	600	N/A	12,700
FY 2021	N/A	700	N/A	8,700
FY 2022	N/A	544	N/A	600
FY 2023	N/A	0	N/A	483
Total, TPC	**N/A**	**174,700**	**N/A**	**174,700**

D&D Subproject (16-D-515-02)

(dollars in thousands)

	Appropriations	Plan	Obligations	Costs
Total Estimated Cost (TEC)				
TEC				
FY 2020	N/A	N/A	N/A	N/A
FY 2021	N/A	N/A	N/A	N/A
Total, TEC	**N/A**	**N/A**	**N/A**	**N/A**
Other Project Cost (OPC)				
OPC except D&D				
FY 2020	N/A	N/A	N/A	N/A
FY 2021	N/A	N/A	N/A	N/A
Total, OPC except D&D	**N/A**	**N/A**	**N/A**	**N/A**
D&D				
FY 2020	N/A	2,500	N/A	2,400

(dollars in thousands)

	Appropriations	Plan	Obligations	Costs
FY 2021	N/A	2,600	N/A	2,500
FY 2022	N/A	22,200	N/A	21,700
FY 2023	N/A	0	N/A	700
Total, D&D	**N/A**	**27,300**	**N/A**	**27,300**
OPC				
FY 2020	N/A	2,500	N/A	2,400
FY 2021	N/A	2,600	N/A	2,500
FY 2022	N/A	22,200	N/A	21,700
FY 2023	N/A	0	N/A	700
Total, OPC	**N/A**	**27,300**	**N/A**	**27,300**
Total Project Cost (TPC)				
FY 2020	N/A	2,500	N/A	2,400
FY 2021	N/A	2,600	N/A	2,500
FY 2022	N/A	22,200	N/A	21,700
FY 2023	N/A	0	N/A	700
Total, TPC	**N/A**	**27,300**	**N/A**	**27,300**

Total Project

(dollars in thousands)

	Appropriations	Plan	Obligations	Costs
Total Estimated Cost (TEC)				
Design				
FY 2016	N/A	8,000	N/A	3,247
FY 2017	N/A	3,000	N/A	6,770
FY 2018	N/A	0	N/A	983
Total, Design	**N/A**	**11,000**	**N/A**	**11,000**
Construction				
FY 2017	N/A	12,047	N/A	0
FY 2018	N/A	98,000	N/A	54,000
FY 2019	N/A	47,953	N/A	84,000
FY 2020	N/A	0	N/A	12,000
FY 2021	N/A	0	N/A	8,000
Total, Construction	**N/A**	**158,000**	**N/A**	**158,000**
TEC				
FY 2016	8,000	8,000	8,000	3,247
FY 2017	15,047	15,047	15,047	6,770
FY 2018	98,000	98,000	98,000	54,983
FY 2019	47,953	47,953	47,953	84,000
FY 2020	0	0	0	12,000
FY 2021	0	0	0	8,000
Total, TEC	**169,000**	**169,000**	**169,000**	**169,000**

	(dollars in thousands)			
	Appropriations	**Plan**	**Obligations**	**Costs**
OPC except D&D				
FY 2015	250	250	250	223
FY 2016	2,456	2,456	2,456	994
FY 2017	0	0	0	900
FY 2018	550	550	550	600
FY 2019	600	600	600	500
FY 2020	600	600	600	700
FY 2021	700	700	700	700
FY 2022	544	544	544	600
FY 2023	0	0	0	483
Total, OPC except D&D	**5,700**	**5,700**	**5,700**	**5,700**
D&D				
FY 2020	2,500	2,500	2,500	2,400
FY 2021	2,600	2,600	2,600	2,500
FY 2022	22,200	22,200	22,200	21,700
FY 2023	0	0	0	700
Total, D&D	**27,300**	**27,300**	**27,300**	**27,300**
OPC				
FY 2015	250	250	250	223
FY 2016	2,456	2,456	2,456	994
FY 2017	0	0	0	900
FY 2018	550	550	550	600
FY 2019	600	600	600	500
FY 2020	3,100	3,100	3,100	3,100
FY 2021	3,300	3,300	3,300	3,200
FY 2022	22,744	22,744	22,744	22,300
FY 2023	0	0	0	1,183
Total, OPC	**33,000**	**33,000**	**33,000**	**33,000**
Total Project Cost (TPC)				
FY 2015	250	250	250	223
FY 2016	10,456	10,456	10,456	4,241
FY 2017	15,047	15,047	15,047	7,670
FY 2018	98,550	98,550	98,550	55,583
FY 2019	48,553	48,553	48,553	84,500
FY 2020	3,100	3,100	3,100	15,100
FY 2021	3,300	3,300	3,300	11,200
FY 2022	22,744	22,744	22,744	22,300
FY 2023	0	0	0	1,183
Total, TPC	**202,000**	**202,000**	**202,000**	**202,000**

Details of Project Cost Estimate

New Facility Subproject (16-D-515-01)

	(dollars in thousands)		
	Current Total Estimate	**Previous Total Estimate**	**Original Validated Baseline**
Total Estimated Cost (TEC)			
Design			
Design	10,571	N/A	N/A
Contingency	429	N/A	N/A
Total, Design	**11,000**	**N/A**	**N/A**
Construction			
Site Work	3,500	N/A	N/A
Construction	126,500	N/A	N/A
FPD Support	12,500	N/A	N/A
Contingency	15,500	N/A	N/A
Total, Construction	**158,000**	**N/A**	**N/A**
Total, TEC	**169,000**	**N/A**	**N/A**
Contingency, TEC	15,929	N/A	N/A
Other Project Cost (OPC)			
OPC except D&D			
Conceptual Planning	223	N/A	N/A
Conceptual Design	375	N/A	N/A
FPD Support and Review	3,102	N/A	N/A
Startup	1,000	N/A	N/A
Contingency	1,000	N/A	N/A
Total, OPC except D&D	**5,700**	**N/A**	**N/A**
D&D			
D&D	N/A	N/A	N/A
Contingency	N/A	N/A	N/A
Total, D&D	**N/A**	**N/A**	**N/A**
Total, OPC	**5,700**	**N/A**	**N/A**
Contingency, OPC	1,000	N/A	N/A
Total, TPC	**174,700**	**N/A**	**N/A**
Total, Contingency	**16,929**	**N/A**	**N/A**

D&D Subproject (16-D-515-02)

(dollars in thousands)

	Current Total Estimate	Previous Total Estimate	Original Validated Baseline
Total Estimated Cost (TEC)			
Design			
Design	N/A	N/A	N/A
Contingency	N/A	N/A	N/A
Total, Design	**N/A**	**N/A**	**N/A**
Construction			
Site Work	N/A	N/A	N/A
Construction	N/A	N/A	N/A
FPD Support	N/A	N/A	N/A
Contingency	N/A	N/A	N/A
Total, Construction	**N/A**	**N/A**	**N/A**
Total, TEC	**N/A**	**N/A**	**N/A**
Contingency, TEC	N/A	N/A	N/A
Other Project Cost (OPC)			
OPC except D&D			
Conceptual Planning	N/A	N/A	N/A
Conceptual Design	N/A	N/A	N/A
FPD Support and Review	N/A	N/A	N/A
Startup	N/A	N/A	N/A
Contingency	N/A	N/A	N/A
Total, OPC except D&D	**N/A**	**N/A**	**N/A**
D&D			
D&D	26,000	N/A	N/A
Contingency	1,300	N/A	N/A
Total, D&D	**27,300**	**N/A**	**N/A**
Total, OPC	**27,300**	**N/A**	**N/A**
Contingency, OPC	1,300	N/A	N/A
Total, TPC	**27,300**	**N/A**	**N/A**
Total, Contingency	**1,300**	**N/A**	**N/A**

Total Project

	(dollars in thousands)		
	Current Total Estimate	**Previous Total Estimate**	**Original Validated Baseline**
Total Estimated Cost (TEC)			
Design			
Design	10,571	14,200	N/A
Contingency	429	500	N/A
Total, Design	**11,000**	**14,700**	**N/A**
Construction			
Site Work	3,500	12,700	N/A
Construction	126,500	126,000	N/A
FPD Support	12,500	0	N/A
Contingency	15,500	15,200	N/A
Total, Construction	**158,000**	**153,900**	**N/A**
Total, TEC	**169,000**	**168,600**	**N/A**
Contingency, TEC	15,929	15,700	N/A
Other Project Cost (OPC)			
OPC except D&D			
Conceptual Planning	223	890	N/A
Conceptual Design	375	1,200	N/A
FPD Support and Review	3,102	0	N/A
Startup	1,000	1,000	N/A
Contingency	1,000	600	N/A
Total, OPC except D&D	**5,700**	**3,690**	**N/A**
D&D			
D&D	26,000	21,900	N/A
Contingency	1,300	2,310	N/A
Total, D&D	**27,300**	**24,210**	**N/A**
Total, OPC	**33,000**	**27,900**	**N/A**
Contingency, OPC	2,300	2,910	N/A
Total, TPC	**202,000**	**196,500**	**N/A**
Total, Contingency	**18,229**	**18,610**	**N/A**

Schedule of Appropriation Requests

(dollars in thousands)

Request		Prior Years	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	Outyears	Total
FY 2017	TEC	8,000	15,047	50,000	0	0	0	0	0	**73,047**
	OPC	2,690	0	0	0	0	0	0	0	**2,690**
	TPC	10,690	15,047	50,000	0	0	0	0	0	**75,737**
FY 2018	TEC	8,000	15,047	98,000	47,953	0	0	0	0	**169,000**
	OPC	2,706	0	550	600	3,100	3,300	22,744	0	**33,000**
	TPC	10,706	15,047	98,550	48,553	3,100	3,300	22,744	0	**202,000**

Related Operations and Maintenance Funding Requirements

Start of Operation or Beneficial Occupancy (fiscal quarter or date)	1QFY 2022
Expected Useful Life (number of years)	40
Expected Future Start of D&D of this capital asset (fiscal quarter)	1QFY 2062

(Related Funding requirements)

(dollars in thousands)

	Annual Costs		Life Cycle Costs	
	Current Total Estimate	Previous Total Estimate	Current Total Estimate	Previous Total Estimate
Operations	1,752	1,550	70,080	62,000
Utilities	3,814	3,375	152,560	135,300
Maintenance & Repair	2,260	2,000	90,400	80,000
Total	**7,8265**	**6,925**	**313,040**	**277,300**

D&D Information

The new area being constructed in this project is replacing existing facilities, and the costs of D&D of the facilities being replaced are included in the costs of this construction project.

	Square Feet
New area being constructed by this project at the Albuquerque Complex	333,000
Area of D&D in this project at the Albuquerque Complex	312,000
Area at the Albuquerque Complex to be transferred, sold, and/or D&D outside the project including area previously "banked"	15,500
Area of D&D in this project at other sites	0

	Square Feet
Area at other sites to be transferred, sold, and/or D&D outside the project including area previously "banked"	5,500
Total area eliminated	333,000

Characterization will be initiated in FY 2021 with abatement/D&D commencing once personnel are moved into the new facility. Completion of D&D is expected 3Q FY 2023.

Names and site locations of existing facilities to be D&D by this project:

Albuquerque	Bldg. 20380	2,634 sq ft
Albuquerque	Bldg. 20381	34,058 sq ft
Albuquerque	Bldg. 20381-A	14,284 sq ft
Albuquerque	Bldg. 20382	34,874 sq ft
Albuquerque	Bldg. 20383	36,351 sq ft
Albuquerque	Bldg. 20384	33,270 sq ft
Albuquerque	Bldg. 20385	40,525 sq ft
Albuquerque	Bldg. 20387	9,954 sq ft
Albuquerque	Bldg. 20388	16,093 sq ft
Albuquerque	Bldg. 20390	5,513 sq ft
Albuquerque	Bldg. 20391	14,939 sq ft
Albuquerque	Bldg. 20392	17,286 sq ft
Albuquerque	Bldg. 20393	12,209 sq ft
Albuquerque	Bldg. 20397	8,690 sq ft
Albuquerque	Bldg. 20398	287 sq ft
Albuquerque	Bldg. 20401	8,537 sq ft
Albuquerque	Bldg. Mod 12	2,227 sq ft
Albuquerque	Bldg. SC 1	5,770 sq ft
Albuquerque	Bldg. SC 2	1,448 sq ft
Albuquerque	Bldg. SC 3	4,348 sq ft
Albuquerque	Bldg. SC 4	4,312 sq ft
Albuquerque	Bldg. SC 5	2,880 sq ft
Albuquerque	Bldg. SC 6	1,440 sq ft

Acquisition Approach

Design and construction contracts will be acquired through full and open competition executed by USACE; selection will be based on best value to the government and awards will be on firm-fixed price delivery. D&D will be a best value, unit-price contract.

This project is being executed by the USACE under a Firm Fixed Price contract that will be incrementally funded by the Department of Energy.

15-D-613, Emergency Operations Center, Y-12
Y-12 National Security Complex, Oak Ridge, Tennessee
Project is for Design and Construction

Significant Changes and Summary

Significant Changes

This Construction Project Data Sheet (CPDS) is an update of the Fiscal Year (FY) 2017 CPDS and does not include a new start for the budget year.

The project achieved Critical Decision (CD)-1 in January 2016, and the forecasted approval of the combined CD-2/3 is July 2017. The Total Estimated Cost (TEC) has increased by $7,000 and the Other Project Costs (OPC) have increased by $1,232 (for a Total Project Cost (TPC) increase of $8,232) to reflect the impact of the estimate provided by the U.S. Army Corps of Engineers (USACE) and to include Enterprise Construction Management (ECM) support to the Federal Project Director.

Summary

The most recent DOE O 413.3B approved CD is CD-1, Approve Alternative Selection and Cost Range, approved on January 5, 2016, with a preliminary TPC cost range of $20,400 to $33,600 and a projected CD-4 of Second Quarter (Q) FY 2021.

A Federal Project Director has been assigned to this project and has approved this CPDS.

The objective of the EOC project is to provide a facility that meets the requirements as driven by the DOE Order 151.1C. The preferred alternative for the project would design and build a new emergency response facility that will more effectively and efficiently support the Y-12 missions by consolidating the Plant Shift Superintendent's Office (PSS), the Emergency Command Center (ECC), the Technical Support Center (TSC), and the Fire Department Alarm Room (FDAR) in a survivable facility.

An interagency agreement has been established with the USACE with an effective date of September 23, 2016. Management and Operating (M&O) partner led project design was complete as of January 26, 2017. FY 2018 TEC funds will be used for construction execution, including contingency, and are needed to allow for construction subcontract award.

Critical Milestone History[a]

	CD-0	Conceptual Design Complete	CD-1	CD-2	Final Design Complete	CD-3	D&D Complete	CD-4
FY 2015	07/26/2012		2QFY 2015	1QFY 2016	1QFY 2017	2QFY 2017	N/A	2QFY 2020
FY 2016	07/26/2012	2QFY 2015	2QFY 2015	2QFY 2017	1QFY 2017	2QFY 2017	N/A	2QFY 2020
FY 2017	07/26/2012	11/17/2015	01/05/2016	4QFY 2017	2QFY 2017	4QFY2017	N/A	1QFY 2021
FY 2018	07/26/2012	11/17/2015	01/05/2016	4QFY 2017	1/26/2017	4QFY 2017	N/A	2QFY 2021

CD-0 – Approve Mission Need
Conceptual Design Complete – Actual date the conceptual design was completed (if applicable)
CD-1 – Approve Alternative Selection and Cost Range
CD-2 – Approve Performance Baseline
Final Design Complete – Estimated/Actual date the project design will be/was complete(d)
CD-3 – Approve Start of Construction/Execution
D&D Complete – Completion of D&D work (see Section 9)
CD-4 – Approve Start of Operations or Project Completion

[a] The schedules are only estimates and consistent with the high end of the schedule ranges.

PB – Indicates the Performance Baseline

Project Cost History[a][b]
(dollars in thousands)

	TEC, Design	TEC, Construction	TEC, Total	OPC Except D&D	OPC, D&D	OPC, Total	TPC
FY 2015	4,000	16,000	20,000	2,500	N/A	2,500	22,500
FY 2016	4,000	16,000	20,000	3,350	N/A	3,350	23,350
FY 2017	2,920	18,999	21,919	4,250	N/A	4,250	26,169
FY 2018	2,920	25,999	28,919	5,482	N/A	5,482	34,401

Project Scope and Justification

Scope

The final scope, schedule, and estimate will be established at the time the project CD-2/3 is approved. Scope includes, construction contract solicitations and award, construction, Title III design, transition and turnover, commissioning, critical decisions, reporting, financial closeout, etc. During the conceptual design phase, feasible options have been evaluated to ensure the space need is correctly sized to meet the sites critical mission needs. The selected alternative is to design and build a new emergency response facility that will consolidate the PSS, the ECC, the TSC, and the FDAR in a survivable facility.

The building is estimated to be approximately 12,000 sq ft; single story; allow for a normal occupancy of approximately 5 to 10 and up to approximately 40 during an emergency event; and contain or interface with approximately 30 systems that support emergency management functions. Minimum capabilities based on DOE Order 151.1C, will be provided. The new building will be energy sustainable and will be designed with close consideration of Leadership in Energy and Environmental Design (LEED) Gold standards.

Justification

The existing PSS and TSC facilities are beyond their useful lives. The current onsite facility is not compliant with DOE Order 151.1C "Comprehensive Emergency Management System." The order requires that emergency operations/response centers be capable of supporting continuous emergency operations for an extended period of time and survive various severe events, such as earthquakes and tornadoes. The existing facility has the following limitations:

- Using aging facilities with extremely limited workspace; facilities not designed to survive the high-consequence natural phenomena events such as earthquakes, tornadoes, or floods.
- Existing facilities are within the range of worst-case hazardous material releases analyzed in the preliminary hazard assessments and due to leak path factors, the facilities will not provide a significant barrier to hazardous material releases and not equipped with positive pressure filtration system, i.e. HEPA filtration for habitability.
- Lacks provision to sustain 24 hour operations for durations required by DOE Order 151.1C

An Independent Analysis of Alternatives was conducted during the conceptual design phase in accordance with the requirements of Office of Management and Budget (OMB) Circular A-11. Multiple alternatives were analyzed including Renovation of Existing Facilities; New Construction of a Single Facility; and Combined New Construction and Renovation. The Independent Analysis of Alternatives resulted in a recommendation for New Construction of a Single Facility.

The project started a risk assessment during the early planning and initial concept phase. A risk-adjusted cost estimate and a plan to eliminate, mitigate or manage risk has been developed and will be maintained through-out the life of the project. Funds appropriated under this data sheet may be used for contracted support services to the Federal Project Director and to conduct reviews of design and construction. The project is being conducted in accordance with the project management requirements in DOE O 413.3B, Program and Project Management for the Acquisition of Capital Assets.

[a] No construction will be performed until the project performance baseline has been validated and CD-3 has been approved.
[b] The FY 2018 numbers are only estimates and consistent with the high end values of the cost ranges.

Financial Schedule

	(dollars in thousands)			
	Appropriations	**Plan**	**Obligations**	**Costs**
Total Estimated Cost (TEC)				
Design				
FY 2015	N/A	2,000	N/A	0
FY 2016	N/A	920	N/A	1,466
FY 2017	N/A	0	N/A	1,454
Total, Design	**N/A**	**2,920**	**N/A**	**2,920**
Construction				
FY 2016	N/A	16,999	N/A	0
FY 2017	N/A	2,000	N/A	435
FY 2018	N/A	7,000	N/A	10,234
FY 2019	N/A	0	N/A	12,958
FY 2020	N/A	0	N/A	433
FY 2021	N/A	0	N/A	1,939
Total, Construction	**N/A**	**25,999**	**N/A**	**25,999**
Total Estimated Cost (TEC)				
FY 2015	2,000	2,000	2,000	0
FY 2016	17,919	17,919	17,919	1,466
FY 2017	2,000	2,000	2,000	1,889
FY 2018	7,000	7,000	7,000	10,234
FY 2019	0	0	0	12,958
FY 2020	0	0	0	433
FY 2021	0	0	0	1,939
Total, TEC	**28,919**	**28,919**	**28,919**	**28,919**
Other Project Cost (OPC)				
FY 2014	1,300	1,300	1,300	824
FY 2015	700	700	700	1,048
FY 2016	750	750	750	614
FY 2017	500	500	500	500
FY 2018	750	750	750	500
FY 2019	1,000	1,000	1,000	750
FY 2020	482	482	482	1,000
FY 2021	0	0	0	246
Total, OPC	**5,482**	**5,482**	**5,482**	**5,482**
Total Project Cost (TPC)				
FY 2014	1,300	1,300	1,300	824
FY 2015	2,700	2,700	2,700	1,048
FY 2016	18,669	18,669	18,669	2,080
FY 2017	2,500	2,500	2,500	2,389
FY 2018	7,750	7,750	7,750	10,734
FY 2019	1,000	1,000	1,000	13,708
FY 2020	482	482	482	1,433
FY 2021	0	0	0	2,185

	(dollars in thousands)			
	Appropriations	Plan	Obligations	Costs
Total, TPC	34,401	34,401	34,401	34,401

Details of Project Cost Estimate

	(dollars in thousands)		
	Current Total Estimate	Previous Total Estimate	Original Validated Baseline
Total Estimated Cost (TEC)			
Design			
Design	2,724	2,539	N/A
Contingency	196	381	N/A
Total, Design	**2,920**	**2,920**	**N/A**
Construction			
Site Work	1,016	705	N/A
Equipment	605	420	N/A
Construction	18,544	12,872	N/A
FPD Support	832	0	N/A
Contingency	5,002	5,002	N/A
Total, Construction	**25,999**	**18,999**	**N/A**
Total, TEC	**28,919**	**21,919**	**N/A**
Contingency, TEC	**5,198**	**5,383**	**N/A**
Other Project Cost (OPC)			
OPC except D&D			
Conceptual Planning	1,020	1,020	N/A
Conceptual Design	400	400	N/A
Start-Up	827	551	N/A
Other OPC Costs	2,866	1,910	N/A
Contingency	369	369	N/A
Total, OPC except D&D	**5,482**	**4,250**	**N/A**
Total, OPC	**5,482**	**4,250**	**N/A**
Contingency, OPC	**369**	**369**	**N/A**
Total, TPC	**34,401**	**26,169**	**N/A**
Total, Contingency	**5,567**	**5,752**	**N/A**

Schedule of Appropriation Requests

(dollars in thousands)

Request		Prior Years	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	Outyears	Total
FY 2015	TEC	4,000	16,000	0	0	0	0	0	0	**20,000**
	OPC	1,150	500	500	200	150	0	0	0	**2,500**
	TPC	5,150	16,500	500	200	150	0	0	0	**22,500**
FY 2016	TEC	19,919	0	0	0	0	0	0	0	**19,919**
	OPC	2,000	500	500	200	150	0	0	0	**3,350**
	TPC	21,919	500	500	200	150	0	0	0	**23,269**
FY 2017	TEC	19,919	2,000	0	0	0	0	0	0	**21,919**
	OPC	2,750	500	500	500	0	0	0	0	**4,250**
	TPC	22,669	2,500	500	500	0	0	0	0	**26,169**
FY 2018	TEC	19,919	2,000	7,000	0	0	0	0	0	**28,919**
	OPC	2,750	500	750	1,000	482	0	0	0	**5,482**
	TEC	22,669	2,500	7,750	1,000	482	0	0	0	**34,401**

Related Operations and Maintenance Funding Requirements

Start of Operation or Beneficial Occupancy (fiscal quarter or date)	2QFY 2021
Expected Useful Life (number of years)	30
Expected Future Start of D&D of this capital asset (fiscal quarter)	2QFY 2051

(Related Funding requirements)

(dollars in thousands)

	Annual Costs		Life Cycle Costs	
	Current Total Estimate	**Previous Total Estimate**	**Current Total Estimate**	**Previous Total Estimate**
Operations	0	0	712	712
Utilities	171	171	4,930	4,930
Maintenance & Repair	46	46	2,443	2,443
Total	**217**	**217**	**8,085**	**8,085**

D&D Information

The new area proposed to be constructed in this project would replace existing facilities; however, the costs of D&D of the facilities that would be replaced are not included in the costs of this construction project. The current EOC this project replaces occupies a small portion of the 9706-2 Building. Per the Master Plan for the Y-12 National Security Complex, Building 9706-2 is to be demolished in FY 2024. The project will utilize 12,000 square feet of previously banked facilities at Y-12 to meet the one-for-one requirement.

	Square Feet
New area being constructed by this project at Y-12……………………….…	12,000
Area of D&D in this project at Y-12…………………………………………………	0
Area at Y-12 to be transferred, sold, and/or D&D outside the project including area previously "banked"……..……………………………………….……	12,000
Area of D&D in this project at other sites……………..…..………………….....	0
Area at other sites to be transferred, sold, and/or D&D outside the project including area previously "banked"………………………..………….….	0
Total Area Eliminated:……………………………………………………….………	12,000

Acquisition Approach

The design of the facility was led by the M&O contractor. The Building, Utilities and Site design was accomplished through a firm-fixed-price contract with an Architectural and Engineering Firm. The Specialty System Design was accomplished by in-house design engineering.

Construction execution is to be executed via a federal led interagency agreement with the USACE, for building construction, and M&O led Specialty System construction installation. USACE will use a firm-fixed-price subcontract as the method of accomplishment for building construction. The M&O will use in-house construction resources as well as an existing site contract for communication installation.

07-D-220, Radioactive Liquid Waste Treatment Facility Upgrade Project,
Los Alamos National Laboratory (LANL), Los Alamos, New Mexico
Project is for Construction Only

Significant Changes and Summary

Significant Changes

This Construction Project Data Sheet (CPDS) is an update of the Fiscal Year (FY) 2016 Updated CPDS and does not include a new start for the budget year.

Since approval of the Low Level Waste (LLW) subproject baseline, the LLW project encountered significant performance challenges causing the approved Total Project Cost (TPC) to increase and the CD-4 date to be extended. A revised baseline establishes a revised TPC of $89.8 million, extends the CD-4 date to November 2018 and does not change the approved LLW subproject scope.

As a result of the above an FY 2018 data sheet is being submitted to address a revised baseline with associated funding requirements.

Summary

The most recent DOE O 413.3B approved Critical Decision (CD) is CD-3, Approve Start of Construction for LLW, which was approved on September 26, 2014, with TPC of $82.694 million and CD-4 date of May 31, 2018. A revised baseline for LLW was approved March 02, 2017, with TPC of $89.8 million and CD-4 date of November 30, 2018.

In 2016, 07-D-220-04 Transuranic Liquid Waste Facility was separated from 07-D-220 and is addressed in a separate CPDS.

A Federal Project Director at the appropriate level has been assigned to this project and has approved this CPDS.

07-D-220-01: Single Nuclear Facility
As discussed below, this subproject was cancelled. Remaining funding was moved to other subprojects within the overall project.

07-D-220-02: Zero Liquid Discharge (ZLD)
The most recent DOE O 413.3B approved CD for the ZLD Phase is CD-4, Approve Project Closeout, which was approved on October 19, 2012.

07-D-220-03: Low Level Liquid Waste (LLW) Facility
As a result of the revised baseline additional funds were required and executed through an FY 2017 internal reprogramming of $2.7 million TEC funding. An additional $2.1 million of TEC funding and $3.0 million of OPC funding is requested in FY 2018 to complete the project.

Critical Milestone History

	CD-0	Conceptual Design Complete	CD-1	CD-2	Final Design Complete	CD-3	D&D Complete	CD-4
FY 2007			1QFY2006		4QFY2007	1QFY2008	2QFY2012	1QFY2010
FY 2008			3QFY2006		2QFY2008	3QFY2008	4QFY2012	3QFY2010
FY 2009	10/04/2004		06/05/2006	2QFY2008	3QFY2008	3QFY2008	4QFY2012	3QFY2010
FY 2014	10/04/2004		09/16/2011	4QFY 2016	1QFY 2017	1Q FY 2017	N/A	4Q FY 2020
FY 2014 Update	10/04/2004		09/23/2013	5/21/2014	3/31/2014	9/26/2014	N/A	3Q FY 2018
FY 2016 PB	10/04/2004	6/05/2006	09/23/2013[a]	5/21/2014	3/31/2014	9/26/2014	N/A	3Q FY 2018
FY 2018	10/04/2004	6/05/2006	09/23/2013[a]	5/21/2014	3/31/2014	9/26/2014	N/A	1Q FY 2019

07-D-220-01: Single Nuclear Facility[b]

	CD-0	Conceptual Design Complete	CD-1	CD-2	Final Design Complete	CD-3	D&D Complete	CD-4
FY 2014	10/04/2004		06/05/2006	N/A	10/30/2011	N/A	N/A	N/A
FY 2016	10/04/2004	6/05/2006	06/05/2006	N/A	10/30/2011	N/A	N/A	N/A

07-D-220-02: Zero Liquid Discharge

	CD-0	Conceptual Design Complete	CD-1	CD-2	Final Design Complete	CD-3	D&D Complete	CD-4
FY 2014	10/04/2004		06/05/2006	11/22/2006	04/21/2011	04/21/2011	N/A	10/19/2012
FY 2016	10/04/2004	11/22/2006	06/05/2006	11/22/2006	04/21/2011	04/21/2011	N/A	10/19/2012

07-D-220-03: Low Level Liquid Waste

	CD-0	Conceptual Design Complete	CD-1	CD-2	Final Design Complete	CD-3	D&D Complete	CD-4
FY 2014	10/04/2004		09/16/2011	2QFY 2014	2QFY 2014	2Q FY 2014	N/A	1Q FY 2017
FY 2014 Update	10/04/2004		09/23/2013	5/21/2014	3/31/2014	9/26/2014	N/A	3Q FY 2018
FY 2016 PB	10/04/2004	9/23/2013	09/23/2013	5/21/2014	3/31/2014	9/26/2014	N/A	3Q FY 2018
FY 2018	10/04/2004	9/23/2013	09/23/2013	5/21/2014	3/31/2014	9/26/2014	N/A	1Q FY 2019

CD-0 – Approve Mission Need for a construction project with a conceptual scope and cost range
Conceptual Design Complete – Actual date the conceptual design was completed (if applicable)
CD-1 – Approve Design Scope and Project Cost and Schedule Ranges
CD-2 – Approve Project Performance Baseline
Final Design Complete – Estimated/Actual date the project design will be/was complete(d)
CD-3 – Approve Start of Construction
D&D Complete –Completion of D&D work (see Section 9)
CD-4 – Approve Start of Operations or Project Closeout
PB – Indicates the Performance Baseline

[a] Revised CD-1.
[b] Abandoned due to increased costs.

Project Cost History

	TEC Design (06-D-140-03)	TEC Design 07-D-220	TEC Construction, Total	TEC, Total	OPC Except D&D	OPC, D&D	OPC, Total	TPC
FY 2007	NA	NA	NA	61,100	6,200	8,700		76,000
FY 2008	NA	NA	NA	72,600	15,000	9,000		96,600
FY 2009	11,100	NA	61,410	72,510	15,000	0	15,000	87,510
FY 2010	24,100	NA	TBD	TBD	TBD	0	TBD	TBD
FY 2014	37,492	20,546	124,384	182,422	29,078	0	29,078	211,500
FY 2014 Update	37,492	0	64,147	101,639	17,488	0	17,488	119,127
FY 2016	37,492	0	64,147	101,639	17,488	0	17,488	119,127
FY 2018	37,390	0	68,916	106,306	19,945	0	19,945	126,251

07-D-220-01: Single Nuclear Facility

	TEC Design (06-D-140-03)	TEC Design 07-D-220	TEC Construction, Total	TEC, Total	OPC Except D&D	OPC, D&D	OPC, Total	TPC
FY 2014	23,339	0	0	23,339	5,377	0	5,377	28,716
FY 2014 Update	23,066	0	0	23,066	5,377	0	5,377	28,443
FY 2016	23,066	0	0	23,066	5,377	0	5,377	28,443
FY 2018	23,066	0	0	23,066	5,377	0	5,377	28,443

07-D-220-02: Zero Liquid Discharge

	TEC Design (06-D-140-03)	TEC Design 07-D-220	TEC Construction, Total	TEC, Total	OPC Except D&D	OPC, D&D	OPC, Total	TPC
FY 2014	684	0	6,944	7,628	347	0	347	7,975
FY 2014 Update	957	0	6,610	7,567	423	0	423	7,990
FY 2016	957	0	6,610	7,567	423	0	423	7,990
FY 2018	957	0	6,610	7,567	423	0	423	7,990

07-D-220-03: Low Level Liquid Waste (LLW)

	TEC Design (06-D-140-03)	TEC Design 07-D-220	TEC Construction, Total	TEC, Total	OPC Except D&D	OPC, D&D	OPC, Total	TPC
FY 2014	13,469	0	43,170	56,639	10,574	0	10,574	67,213
FY 2014 Update	13,469	0	57,537	71,006	11,688	0	11,688	82,694
FY 2016	13,469	0	57,537	71,006	11,688	0	11,688	82,694
FY 2018	13,367	0	62,306	75,673	14,145	0	14,145	89,818

Project Scope and Justification

Scope

This project will replace the following RLW treatment capabilities at LANL and reduce the liquid discharge to Mortandad Canyon:

1) LLW treatment of up to 5 million liters each year;
2) Secondary waste treatment; and
3) RLW discharge system/Zero Liquid Discharge (ZLD) system.

07-D-220-01: Single Facility Nuclear Subproject
Initial planning and design was based on a combined single hazard category 2 nuclear facility to treat both the low level and transuranic liquid wastes. The scope included a two-story high reinforced concrete building approximately 20,000 gross square feet in area. The design was abandoned for a cheaper alternative that would meet the mission need.

07-D-220-02: Zero Liquid Discharge Subproject
The scope included construction of large, ground-level concrete evaporation tank that can store up to 5 million liters of liquid that will be discharged from the treatment facilities. In addition, the scope included a transfer line to transport treated liquid from the processing facility to the evaporation tank and a small pump house to transfer back water from the evaporation tank to the facility for further treatment before it could be discharged to the nearby canyon, if needed to meet ground water discharge permit requirements.

07-D-220-03: Low Level Liquid Waste Subproject
The scope includes constructing a single-story reinforced concrete building, approximately 8,000 square feet in area, to house both the processing equipment for treating up to 5 million liters of low level liquid waste, a small control room, laboratory, separate utility building, and other necessary functioning, and two 10,000 gallon effluent tanks. This project is a "like-for-like" replacement of the capability currently provided in the existing RLWTF. The separate utility building will be provided to house mechanical and electrical equipment.

07-D-220-04: Transuranic Liquid Waste Subproject
This subproject was appropriated as a separate line item, 07-D-220-04, and is no longer funded under this CPDS.

Justification

The replacement is needed to remediate significant deficiencies associated with the existing RLW treatment capabilities that pose a threat to the long-term availability of this function. The replacement is ultimately aimed at providing an RLW treatment capability that is safe, reliable, and effective for the next 50 years in support of primary missions at LANL.

Significant portions of the RLW system are almost 50 years old and their reliability is significantly diminished. The transuranic storage tank failure demonstrated the inability of RLW components to remain in service beyond their design life and exemplified the high cost of repair. The existing treatment facility is in need of significant upgrades in order to comply with current codes and standards including International Building Code, seismic design/construction codes and the National Electric Code (NEC). Operations and safety reviews have highlighted the need for enhanced seismic conformance for the existing facility. Continuous workarounds are required to keep systems running and excessive corrosion threatens system availability. Degraded and outdated facility systems pose elevated risk to workers.

The project is being conducted in accordance with the project management requirements in DOE Order 413.3B, Program and Project Management for the Acquisition of Capital Assets.

Funds appropriated under this data sheet may be used to provide independent assessments of the planning and execution of this project.

Financial Schedule

07-D-220-01: Single Nuclear Facility Subproject

	(dollars in thousands)		
	Appropriations	**Obligations**	**Costs**
Total Estimated Cost (TEC)			
Design			
FY 2006	5,379	3,000	362
FY 2007	10,077	8,100	6,020
FY 2008	990	5,346	3,341
FY 2009	6,620	6,620	8,937
FY 2010	0	0	4,406
Total, Design (06-140-03)	**23,066**	**23,066**	**23,066**
Construction			
	0	0	0
Total, Construction	**0**	**0**	**0**
TEC			
FY 2006	5,379	3,000	362
FY 2007	10,077	8,100	6,020
FY 2008	990	5,346	3,341
FY 2009	6,620	6,620	8,937
FY 2010	0	0	4,406
Total, TEC	**23,066**	**23,066**	**23,066**
Other Project Cost (OPC)			
OPC except D&D			
FY 2005	2,028	2,028	2,028
FY 2006	2,137	2,137	2,137
FY 2007	990	990	990
FY 2008	212	212	212
FY 2009	10	10	10
Total, OPC except D&D	**5,377**	**5,377**	**5,377**
Total Project Cost (TPC)			
FY 2005	2,028	N/A	2,028
FY 2006	2,499	N/A	2,499
FY 2007	7,010	N/A	7,010
FY 2008	3,553	N/A	3,553
FY 2009	8,947	N/A	8,947
FY 2010	4,406	N/A	4,406
Total, TPC	**28,443**	**N/A**	**28,443**

	(dollars in thousands)		
	Appropriations	**Obligations**	**Costs**
07-D-220-02: : Zero Liquid Discharge Subproject			
Total Estimated Cost (TEC)			
Design			
FY 2010	N/A	N/A	957
Total, Design (06-D-140-03)	**N/A**	**N/A**	**957**
Construction			
FY 2011	N/A	N/A	1,707
FY 2012	N/A	N/A	4,569
FY 2013	N/A	N/A	332
FY 2014	N/A	N/A	2
Total, Construction	**N/A**	**N/A**	**6,610**
TEC			
FY 2010	N/A	N/A	957
FY 2011	N/A	N/A	1,707
FY 2012	N/A	N/A	4,569
FY 2013	N/A	N/A	332
FY 2014	N/A	N/A	2
Total, TEC	**N/A**	**N/A**	**7,567**
Other Project Cost (OPC)			
OPC except D&D			
FY 2012	N/A	N/A	254
FY 2013	N/A	N/A	167
FY 2014	N/A	N/A	2
Total, OPC except D&D	**N/A**	**N/A**	**423**
Total Project Cost (TPC)			
FY 2010	N/A	N/A	957
FY 2011	N/A	N/A	1,707
FY 2012	N/A	N/A	4,823
FY 2013	N/A	N/A	499
FY 2014	N/A	N/A	4
Total, TPC	**N/A**	**N/A**	**7,990**

07-D-220-03: Low Level Liquid Waste Subproject

(dollars in thousands)

	Appropriations	Plan	Obligations	Costs
Total Estimated Cost (TEC)				
Design				
FY 2010	N/A	2,103	N/A	2,103
FY 2011	N/A	741	N/A	741
FY 2012	N/A	5,697	N/A	5,697
FY 2013	N/A	2,309	N/A	2,309
FY 2014	N/A	2,427	N/A	2,427
FY 2015	N/A	90	N/A	90
Total, Design (06-D-140-03)	**N/A**	**13,367**	**N/A**	**13,367**
Construction				
FY 2014	N/A	46,004	N/A	274
FY 2015	N/A		N/A	8,006
FY 2016	N/A	11,533	N/A	19,146
FY 2017	N/A	2,669	N/A	23,969
FY 2018	N/A	2,100	N/A	10,911
Total, Construction	**N/A**	**62,306**	**N/A**	**62,306**
TEC				
FY 2010	N/A	2,103	N/A	2,103
FY 2011	N/A	741	N/A	741
FY 2012	N/A	5,697	N/A	5,697
FY 2013	N/A	2,309	N/A	2,309
FY 2014	N/A	48,431	N/A	2,701
FY 2015	N/A	90	N/A	8,096
FY 2016	N/A	11,533	N/A	19,146
FY 2017	N/A	2,669	N/A	23,969
FY 2018	N/A	2,100	N/A	10,911
Total, TEC	**N/A**	**75,673**	**N/A**	**75,673**
Other Project Cost (OPC)				
OPC except D&D				
FY 2009	N/A	1,448	N/A	1,448
FY 2010	N/A	1,955	N/A	1,955
FY 2011	N/A	1,955	N/A	1,955
FY 2012	N/A	444	N/A	444
FY 2013	N/A	487	N/A	487
FY 2014	N/A	531	N/A	531

(dollars in thousands)

	Appropriations	Plan	Obligations	Costs
FY 2015	N/A	325	N/A	325
FY 2016	N/A	3,741	N/A	3,741
FY 2017	N/A	259	N/A	259
FY 2018	N/A	2,700	N/A	2,700
FY 2019	N/A	300	N/A	300
Total, OPC except D&D	**N/A**	**14,145**	**N/A**	**14,145**
Total Project Cost (TPC)				
FY 2009	N/A	1,448	N/A	1,448
FY 2010	N/A	4,058	N/A	4,058
FY 2011	N/A	2,696	N/A	2,696
FY 2012	N/A	6,141	N/A	6,141
FY 2013	N/A	2,796	N/A	2,796
FY 2014	N/A	48,962	N/A	3,232
FY 2015	N/A	415	N/A	8,523
FY 2016	N/A	15,274	N/A	22,887
FY 2017	N/A	2,928	N/A	24,228
FY 2018	N/A	4,800	N/A	13,611
FY 2019	N/A	300	N/A	300
Total, TPC	**N/A**	**89,818**	**N/A**	**89,818**

Total Project

(dollars in thousands)

Total Estimated Cost (TEC)	Appropriations	Plan	Obligations	Costs
Design				
FY 2006	5,379	5,379	3,000	362
FY 2007	10,077	10,077	8,100	6,020
FY 2008	990	990	5,346	3,341
FY 2009	10,054	10,054	7,554	8,937
FY 2010	7,000	7,000	7,000	7,466
FY 2011	3,890	3,890	3,890	741
FY 2012	0	0	0	5,697
FY 2013	0	0	0	2,309
FY 2014	0	0	2,500	2,427
FY 2015	0	0	0	90
Total, Design (06-D-140-03)	**37,390**	**37,390**	**37,390**	**37,390**

	(dollars in thousands)			
Construction	**Appropriations**	**Plan**	**Obligations**	**Costs**
FY 2008	0	0	0	0
FY 2009	7,500	6,610	7,500	0
FY 2010	0	0	0	0
FY 2011	0	0	0	1,707
FY 2012	0	0	0	4,569
FY 2013	0	0	0	332
FY 2014	45,114	46,004	45,114	276
FY 2015	0	0	0	8,006
FY 2016	11,533	11,533	11,533	19,146
FY 2017	2,669[a]	2,669	2,669	23,969
FY 2018	2,100	2,100	2,100	10,911
Total, Construction	**68,916**	**68,916**	**68,916**	**68,916**
TEC				
FY 2006	5,379	5,379	3,000	362
FY 2007	10,077	10,077	8,100	6,020
FY 2008	990	990	5,346	3,341
FY 2009	17,554	16,664	15,054	8,937
FY 2010	7,000	7,000	7,000	7,466
FY 2011	3,890	3,890	3,890	2,448
FY 2012	0	0	0	10,266
FY 2013	0	0	0	2,641
FY 2014	45,114	46,004	47,614	2,703
FY 2015	0	0	0	8,096
FY 2016	11,533	11,533	11,533	19,146
FY 2017	2,669[a]	2,669	2,669	23,969
FY 2018	2,100	2,100	2,100	10,911
Total, TEC	**106,306**	**106,306**	**106,306**	**106,306**
Other Project Cost (OPC)				
OPC except D&D				
FY 2005	2,028	2,028	2,028	2,028
FY 2006	2,137	2,137	2,137	2,137
FY 2007	990	990	990	990
FY 2008	212	212	212	212
FY 2009	1,458	1,458	1,458	1,458
FY 2010	1,955	1,955	1,955	1,955
FY 2011	1,955	1,955	1,955	1,955

[a] FY 2017 Appropriations reflect internal reprogramming of $2,669.

	(dollars in thousands)			
	Appropriations	**Plan**	**Obligations**	**Costs**
FY 2012	698	698	698	698
FY 2013	654	654	654	654
FY 2014	533	533	533	533
FY 2015	325	325	325	325
FY 2016	3,741	3,741	3,741	3,741
FY 2017	259	259	259	259
FY 2018	2,700	2,700	2,700	2,700
FY 2019	300	300	300	300
Total, OPC except D&D	**19,945**	**19,945**	**19,945**	**19,945**
TPC				
FY 2005	2,028	2,028	2,028	2,028
FY 2006	7,516	7,516	5,137	2,499
FY 2007	11,067	11,067	9,090	7,010
FY 2008	1,202	1,202	5,558	3,553
FY 2009	19,012	18,122	16,512	10,395
FY 2010	8,955	8,955	8,955	9,421
FY 2011	5,845	5,845	5,845	4,403
FY 2012	698	698	698	10,964
FY 2013	654	654	654	3,295
FY 2014	45,647	46,537	48,147	3,236
FY 2015	325	325	325	8,421
FY 2016	15,274	15,274	15,274	22,887
FY 2017	2,928	2,928	2,928	24,228
FY 2018	4,800	4,800	4,800	13,611
FY 2019	300	300	300	300
Total, TPC	**126,251**	**126,251**	**126,251**	**126,251**

Details of Project Cost Estimate

07-D-220-01: Single Nuclear Facility Subproject

(dollars in thousands)

	Current Total Estimate	Previous Total Estimate	Original Validated Baseline
Total Estimated Cost (TEC)			
Design (06-D-140-03)	23,066	23,066	N/A
Contingency	0	0	N/A
Total Design	**23,066**	**23,066**	**N/A**
Construction			
Other Construction	0	0	N/A
Contingency	0	0	N/A
Total, Construction	**0**	**0**	**N/A**
Total, TEC	**23,066**	**23,066**	**N/A**
Contingency, TEC	0	0	N/A
Other Project Cost (OPC)			
OPC except D&D			
Conceptual Planning	0	0	N/A
Conceptual Design	0	0	N/A
Safety Basis & Design Support	5,377	5,377	N/A
Start-up	0	0	N/A
Contingency	0	0	N/A
Total, OPC except D&D	**5,377**	**5,377**	**N/A**
Total, OPC	**5,377**	**5,377**	**N/A**
Contingency, OPC	0	0	N/A
Total, TPC	**28,443**	**28,443**	**N/A**
Total, Contingency	**0**	**0**	**N/A**

07-D-220-02: Zero Liquid Discharge Subproject

(dollars in thousands)

	Current Total Estimate	Previous Total Estimate	Original Validated Baseline
Total Estimated Cost (TEC)			
Design (06-D-140-03)	957	957	684
Contingency	0	0	0
Total Design	**957**	**957**	**684**
Construction			
Other Construction	6,610	6,610	7,287
Contingency	0	0	1,458
Total, Construction	**6,610**	**6,610**	**8,745**
Total, TEC	**7,567**	**7,567**	**9,429**
Contingency, TEC	0	0	1,458
Other Project Cost (OPC)			
OPC except D&D			
Start-up	423	423	150
Contingency	0	0	0
Total, OPC except D&D	**423**	**423**	**150**
Total, OPC	**423**	**423**	**150**
Contingency, OPC	0	0	0
Total, TPC	**7,990**	**7,990**	**9,579**
Total, Contingency	**0**	**0**	**1,458**

07-D-220-03: Low Level Liquid Waste Subproject

	(dollars in thousands)		
	Current Total Estimate	**Previous Total Estimate**	**Original Validated Baseline**
Total Estimated Cost (TEC)			
Design			
Design (06-D-140-03)	13,367	13,269	13,269
Contingency (06-D-140-03)		200	200
Design (07-D-220)		0	0
Total, Design	**13,367**	**13,469**	**13,469**
Construction			
Other Construction	55,128	36,153	36,153
Construction Support (Federal)	4,278	3,000	3,000
Contingency	2,900	18,384	18,384
Total, Construction	**62,306**	**57,537**	**57,537**
Total, TEC	**75,673**	**71,006**	**71,006**
Contingency, TEC	2,900	18,584	18,584
Other Project Cost (OPC)			
OPC except D&D			
Conceptual Planning &	1,370	1,370	1,370
Conceptual Design	4,067	4,067	4,067
Safety Basis and Design Support	265	265	265
Start-Up	6,698	5,141	5,141
Contingency	1,736	845	845
Total, OPC except D&D	**14,145**	**11,688**	**11,688**
Total, OPC	**14,145**	**11,688**	**11,688**
Contingency, OPC	1,736	845	845
Total, TPC	**89,818**	**82,694**	**82,694**
Contingency, TPC	**4,645**	**19,429**	**19,429**

Total Project

	(dollars in thousands)		
	Current Total Estimate	**Previous Total Estimate**	**Original Validated Baseline**
Total Estimated Cost (TEC)			
Design			
Design (06-D-140-03)	37,390	37,292	N/A
Contingency (06-D-140-03)		200	N/A
Design (07-D-220)		0	N/A
Design Support (07-D-220)			
Contingency (07-D-220)			
Total, Design	**37,390**	**37,492**	**N/A**
Contingency, Design		200	
Construction			
Other Construction	61,738	42,763	N/A
Construction Support (Federal)	2,900	3,000	N/A
Contingency	4,278	18,384	N/A
Total, Construction	**68,916**	**64,147**	**N/A**
Contingency, Construction	3,678	18,384	
Total, TEC	**106,306**	**101,639**	**N/A**
Contingency, TEC	3,678	18,584	N/A
Other Project Cost (OPC)			
OPC except D&D			
Conceptual Planning &	1,596	1,596	N/A
Conceptual Design	8,007	8,007	N/A
Safety Basis and Design Support	1,476	1,476	N/A
Start-Up	7,130	5,564	N/A
Contingency	1,736	845	N/A
Total, OPC except D&D	**19,945**	**17,488**	**N/A**
Total, OPC	**19,945**	**17,488**	**N/A**
Contingency, OPC	1,736	845	N/A
Total, TPC	**126,251**	**119,127**	**N/A**
Contingency, TPC	**5,414**	**19,429**	**N/A**

Schedule of Appropriation Requests

(Dollars in Thousands)

Request		Prior Years	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	Total
FY 2007	TEC	61,100	0	0	0	0	0	0	**61,100**
	OPC	14,900	0	0	0	0	0	0	**14,900**
	TPC	76,000	0	0	0	0	0	0	**76,000**
FY 2008	TEC	72,600	0	0	0	0	0	0	**72,600**
	OPC	24,000	0	0	0	0	0	0	**24,000**
	TPC	96,600	0	0	0	0	0	0	**96,600**
FY 2009	TEC	72,000	0	0	0	0	0	0	**72,000**
	OPC	15,000	0	0	0	0	0	0	**15,000**
	TPC	87,000	0	0	0	0	0	0	**87,000**
FY 2014	TEC	87,606	0	0	0	0	0	0	**87,606**
	OPC	16,298	0	0	0	0	0	0	**16,298**
	TPC	103,904	0	0	0	0	0	0	**103,904**
FY 2014 Update	TEC	101,639	0	0	0	0	0	0	**101,639**
	OPC	17,229	259	0	0	0	0	0	**17,488**
	TPC	118,868	259	0	0	0	0	0	**119,127**
FY 2016	TEC	101,639	0	0	0	0	0	0	**101,639**
	OPC	17,229	259	0	0	0	0	0	**17,488**
	TPC	118,868	259	0	0	0	0	0	**119,127**
FY 2018	TEC	101,537	2,669	2,100	0	0	0	0	**106,306**
	OPC	16,686	259	2,700	300	0	0	0	**19,945**
	TPC	118,223	2,928	4,800	300	0	0	0	**126,251**

Related Operations and Maintenance Funding Requirements

Start of Operation or Beneficial Occupancy (fiscal quarter or date)	2QFY2013
Expected Useful Life (number of years)	50
Expected Future Start of D&D of this capital asset (fiscal quarter)	2QFY2063

(Related Funding requirements)

(dollars in thousands)

	Annual Costs		Life Cycle Costs	
	Current Total Estimate	**Previous Total Estimate**	**Current Total Estimate**	**Previous Total Estimate**
Operations	6,780	6,780	339,000	339,000
Maintenance	1,860	1,860	93,000	93,000
Total, Operations & Maintenance	8,640	8,640	432,000	432,000

D&D Information

The new area being constructed in this project is replacing existing facilities; however, the costs of D&D of the facilities that are being replaced are not included in the costs of this construction project. The one-for-one offset requirement will be met by utilizing site-banked square footage. A plan for D&D of the existing facility will be developed at the end of construction of the new facility when characterization data is available. D&D of the current facility is too far in the future for accurate cost estimates at this time.

	Square Feet
New area being constructed by this project at LANL………………………….…	10,000
Area of D&D in this project at LANL……………………………………………………	0
Area at LANL to be transferred, sold, and/or D&D outside the project including area previously "banked"………………	10,000
Area of D&D in this project at other sites……………..………………………....	0
Area at other sites to be transferred, sold, and/or D&D outside the project including area previously "banked"…………..…………………….……	0
Total area eliminated ……………………………………..………………………..…….	10,000

Name(s) and site location(s) of existing facility(s) to be replaced: Banked space will be used to meet one for one replacement.

Acquisition Approach

This project is being executed by the management and operating (M&O) contract. The ZLD sub-project was acquired by the M&O contractor through a firm-fixed price, design-build contract. Design services for the single nuclear facility and the LLW were obtained by the M&O contractor through competitively awarded contracts using a firm fixed price contract. Construction of the LLW facility is accomplished using a firm fixed price contracting approach.

07-D-220-04 Transuranic Liquid Waste (TLW) Treatment Facility Upgrade Project, Los Alamos National Laboratory (LANL), Los Alamos, New Mexico Project is for Design and Construction

Significant Changes and Summary

Significant Changes

This Construction Project Data Sheet (CPDS) is an update of the Fiscal Year (FY) 2017 CPDS and does not include a new start for the budget year. The CD-4 date has been updated to reflect the most recent estimates to complete the project, which is a result of deficiencies in the design that need to be corrected and to incorporate lessons-learned in the schedule.

Approval of Critical Decision (CD)-2/3 has been forecasted for 2Q FY 2018 to allow additional time to complete the development of the baseline package and completion of the nuclear safety analysis. The TPC will be finalized as part of the CD 2/3 baseline approval.

In FY 2017, NNSA reprogrammed $1,153 to the Low Level Waste (LLW) Facility subproject of the Radioactive Liquid Waste Treatment Facility project (07-D-220-03) to fund a portion of the increase of the Total Project Cost (TPC) for the LLW subproject.

Summary

The most recent DOE O 413.3B approved Critical Decision (CD) is the Revised CD-1, which was approved on September 23, 2013, with a Total Project Cost (TPC) top range of $96,033 and CD-4 date of 4Q FY 2020.

This project will design, construct, and start-up a new facility to treat transuranic liquid waste generated at the Plutonium Facility (PF-4) at the Los Alamos National Laboratory, the only facility in the nation capable of producing pits for the enduring nuclear stockpile. Approval of the performance baseline will be granted upon the validation of the final design by external reviewers and approval of the Preliminary Documented Safety Analysis by the safety basis approval authority.

Due to changing construction market conditions in northern New Mexico and NNSA's experience with the last two construction projects of this nature, NNSA anticipates few builders will be interested to bid on this project and the price may be higher than government estimates. The Construction contract is expected to be awarded immediately after approval of Critical Decisions 2 and 3 in second quarter, FY 2018. The FY 2018 funding being requested is to mitigate risk associated with expected higher bids to allow for the obligation of funds on the project to continue to meet schedule. A Federal Project Director has been assigned to this project and has approved this CPDS.

Critical Milestone History

	CD-0	Conceptual Design Complete	CD-1	CD-2	Final Design Complete	CD-3	D&D Complete	CD-4
FY 2014	10/04/2004		09/16/2011	4QFY 2016	1QFY 2017	1Q FY 2017	N/A	4Q FY 2020
FY 2015	10/04/2004		09/23/2013	4QFY 2016	1QFY 2017	2Q FY 2017	N/A	4Q FY 2020
FY 2016	10/04/2004	09/23/2013	09/23/2013	4QFY 2017	1QFY 2017	4Q FY 2017	N/A	4Q FY 2020
FY 2017	10/04/2004	09/23/2013	09/23/2013	4Q FY 2017	1Q FY 2017	4Q FY 2017	N/A	4Q FY 2021
FY 2018	10/04/2004	09/23/2013	09/23/2013	2Q FY 2018	02/06/2017	2Q FY 2018	N/A	4Q FY 2023

CD-0 – Approve Mission Need
Conceptual Design Complete – Actual date the conceptual design was completed (if applicable)
CD-1 – Approve Alternative Selection and Cost Range
CD-2 – Approve Performance Baseline

Final Design Complete – Estimated/Actual date the project design will be/was complete(d)
CD-3 – Approve Start of Construction/Execution
D&D Complete –Completion of D&D work (see Section 9)
CD-4 – Approve Start of Operations or Project Completion
PB – Indicates the Performance Baseline

Project Cost History
(dollars in thousands)

	TEC, Design	TEC, Construction	TEC, Total	OPC Except D&D	OPC, D&D	OPC, Total	TPC
FY 2014	20,546	74,270	94,816	12,780	0	12,780	107,596
FY 2015	25,605	60,000	85,605	10,428	0	10,428	96,033
FY 2016	25,605	66,997	92,602	10,428	0	10,428	103,030
FY 2017	25,605	66,997	92,602	10,428	0	10,428	103,030
FY 2018	25,605	67,244	92,849	12,940	0	12,940	105,789

Project Scope and Justification

Scope

The project will design and construct a 2,000-4,000 square foot, hazard category 3 nuclear facility. The reinforced concrete structure will house processing equipment capable of treating up to 29,000 liters of transuranic (TRU) liquid waste each year, and will include a TRU liquid influent storage and separate utilities.

Justification

The existing degraded and outdated treatment facility systems pose elevated risk to workers, public, and environment. Continuous workarounds are required to keep systems running and excessive corrosion threatens system availability. The replacement is needed to remediate significant deficiencies associated with the existing RLW treatment capabilities that pose a threat to the long-term availability of this function. The replacement is ultimately aimed at providing a RLW treatment capability that is safe, reliable, and effective for the next 50 years in support of primary missions at LANL. The new facility will be built to comply with the current codes, Nuclear Safety/Quality, standards including International Building Code, seismic design/construction codes and the National Electric Code (NEC).

The project is being executed in accordance with the project management requirements in DOE Order 413.3B, Program and Project Management for the Acquisition of Capital Assets.

Funds appropriated under this data sheet may be used to provide independent assessments of the planning and execution of this project and for contracted support services to the federal project team for oversight and support.

Construction will not start and funds will not be released for project use until the project achieves CD-3.

Financial Schedule
(dollars in thousands)

	Appropriations	Plan	Obligations	Costs
Total Estimated Cost (TEC)				
Design				
FY 2014	N/A	10,605	N/A	641
FY 2015	N/A	7,500	N/A	4,471
FY 2016	N/A	7,500	N/A	8,474
FY 2017	N/A	0	N/A	8,120
FY 2018	N/A	0	N/A	3,899
Total, Design	**N/A**	**25,605**	**N/A**	**25,605**
Construction				
FY 2016	N/A	33,449	N/A	0
FY 2017	N/A	15,900	N/A	0
FY 2018	N/A	17,895	N/A	13,582
FY 2019	N/A	0	N/A	26,000
FY 2020	N/A	0	N/A	25,000
FY 2021	N/A	0	N/A	2,662
FY 2022	N/A	0	N/A	0
Total, Construction	**N/A**	**67,244**	**N/A**	**67,244**
FY 2014	10,605	10,605	10,605	641
FY 2015	7,500	7,500	7,500	4,471
FY 2016	40,949	40,949	40,949	8,474
FY 2017	15,900[a]	15,900[a]	15,900[a]	8,120
FY 2018	17,895	17,895	17,895	17,481
FY 2019	0		0	26,000
FY 2020	0		0	25,000
FY 2021	0	0	0	2,662
FY 2022	0	0	0	0
Total, TEC	**92,849**	**92,849**	**92,849**	**92,849**
Other Project Cost (OPC)				
OPC except D&D				
FY 2014	3	3	3	3
FY 2015	654	654	654	654

[a] FY 2017 Appropriations, Plan and Obligations reflect a reprogramming of $1,153 from TLW to LLW project from FY 2017 Appropriations Act amount of $17,053.

(dollars in thousands)

	Appropriations	Plan	Obligations	Costs
FY 2016	2,061	2,061	2,061	2,061
FY 2017	1,500	1,500	1,500	1,500
FY 2018	1,500	1,500	1,500	1,500
FY 2019	2,000	2,000	2,000	2,000
FY 2020	1,710	1,710	1,710	1,710
FY 2021	1,000	1,000	1,000	1,000
FY 2022	2,000	2,000	2,000	2,000
FY 2023	512	512	512	512
Total, OPC except D&D	**12,940**	**12,940**	**12,940**	**12,940**
Total, OPC				
FY 2014	3	3	3	3
FY 2015	654	654	654	654
FY 2016	2,061	2,061	2,061	2,061
FY 2017	1,500	1,500	1,500	1,500
FY 2018	1,500	1,500	1,500	1,500
FY 2019	2,000	2,000	2,000	2,000
FY 2020	1,710	1,710	1,710	1,710
FY 2021	1,000	1,000	1,000	1,000
FY 2022	2,000	2,000	2,000	2,000
FY 2023	512	512	512	512
Total, OPC	**12,940**	**12,940**	**12,940**	**12,940**
Total Project Cost (TPC)				
FY 2014	10,608	10,608	10,608	644
FY 2015	8,154	8,154	8,154	5,125
FY 2016	43,010	43,010	43,010	10,535
FY 2017	17,400	17,400	17,400	9,620
FY 2018	19,395	19,395	19,395	18,981
FY 2019	2,000	2,000	2,000	28,000
FY 2020	1,710	1,710	1,710	26,710
FY 2021	1,000	1,000	1,000	3,662
FY 2022	2,000	2,000	2,000	2,000
FY 2023	512	512	512	512
Total, TPC	**105,789**	**105,789**	**105,789**	**105,789**

Details of Project Cost Estimate

(dollars in thousands)

	Current Total Estimate	Previous Total Estimate	Original Validated Baseline
Total Estimated Cost (TEC)			
Design			
Design	22,393	17,393	NA
Design Support (Federal)	1,300	300	NA
Contingency	1,912	7,912	NA
Total, Design	**25,605**	**25,605**	**NA**
Total Design Contingency	**1,912**	**7,912**	**NA**
Construction			
Other Construction	29,237	29,237	NA
Equipment (GFE)	7,500	7,500	NA
Safety Basis	6,997	6,997	NA
Construction Support (Federal)	3,000	2,000	NA
Contingency	20,510	21,263	NA
Total, Construction	**67,244**	**66,997**	**NA**
Total, TEC	**92,849**	**92,602**	**NA**
Contingency, TEC	**22,422**	**29,175**	**NA**
Other Project Cost (OPC)			
OPC except D&D			
Conceptual Planning & Conceptual Design	NA	NA	NA
Design Support	2,041	2,041	NA
Start-Up	5,537	4,537	NA
Contingency	5,362	3,850	NA
Total, OPC except D&D	**12,940**	**10,428**	**NA**
D&D			
D&D	0	0	NA
Contingency	0	0	NA
Total, D&D	**0**	**0**	**NA**
Total, OPC	**12,940**	**10,428**	**NA**
Contingency, OPC	**5,362**	**3,850**	**NA**
Total, TPC	**105,789**	**103,030**	**NA**
Total, Contingency	**27,784**	**33,025**	**NA**

Schedule of Appropriation Requests

		Prior Years	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	Outyears	Total
	TEC	86,053	0	0	0	0	0	0	0	**86,053**
	OPC	4,354	1,500	1,500	2,000	3,426	0	0	0	**12,780**
FY 2014	TPC	90,407	1,500	1,500	2,000	3,426	0	0	0	**98,833**
	TEC	85,605	0	0	0		0	0	0	**85,605**
	OPC	4,354	1,500	1,500	2,000	1,074	0	0	0	**10,428**
FY 2015	TPC	89,959	1,500	1,500	2,000	1,074	0	0	0	**96,033**
	TEC	59,054	17,053	8,995	0	0	0	0	0	**85,102**
	OPC	2,718	1,500	1,500	2,000	2,710	0	0	0	**10,428**
FY 2016	TPC	61,772	18,553	10,495	2,000	2,710	0	0	0	**95,530**
	TEC	59,054	17,053	8,995	0	0	0	0	0	**85,102**
	OPC	2,718	1,500	1,500	2,000	1,710	1,000	0	0	**10,428**
FY 2017	TPC	61,772	18,553	10,495	2,000	1,710	1,000	0	0	**95,530**
	TEC	59,054	15,900	17,895	0	0	0	0	0	**92,849**
	OPC	2,718	1,500	1,500	2,000	1,710	1,000	2,000	512	**12,940**
FY 2018	TPC	61,772	17,400	19,395	2,000	1,710	1,000	2,000	512	**105,789**

Related Operations and Maintenance Funding Requirements

Start of Operation or Beneficial Occupancy (fiscal quarter or date)	2QFY2021
Expected Useful Life (number of years)	50
Expected Future Start of D&D of this capital asset (fiscal quarter)	2QFY2071

(Related Funding requirements)

(dollars in thousands)

	Annual Costs		Life Cycle Costs	
	Current Total Estimate	Previous Total Estimate	Current Total Estimate	Previous Total Estimate
Operations	1,400	1,400	70,000	70,000
Utilities	50	50	2,500	2,500
Maintenance& Repair	400	400	20,000	20,000
Total	**1,850**	**1,850**	**92,500**	**92,500**

D&D Information

The one-for-one offset requirement will be met by utilizing site-banked square footage. A plan for D&D of the existing facility will be developed at the end of construction of the new facility when characterization data is available. D&D of the current facility is too far in the future for accurate cost estimates at this time.

	Square Feet
New area being constructed by this project at LANL	2,000 – 4,000
Area of D&D in this project at LANL	0
Area at LANL to be transferred, sold, and/or D&D outside the project including area previously "banked"	2,000 – 4,000
Area of D&D in this project at other sites	0
Area at other sites to be transferred, sold, and/or D&D outside the project including area previously "banked"	0
Total area eliminated	2,000 - 4,000

Acquisition Approach

The TLW design was and the construction will be obtained through competitively awarded contracts using a firm fixed price contracting.

06-D-141, Uranium Processing Facility (UPF)
Y-12 National Security Complex, Oak Ridge, Tennessee
Project is for Design and Construction

Significant Changes and Summary

Significant Changes

This CPDS is an update from Fiscal Year (FY) 2017 and does not include a new start for the budget year. In December 2016, the UPF project updated its Total Project Cost (TPC) estimate to include estimates at completion for ongoing work and updated quantities for commodities and bulk materials based on preliminary design. The Department's commitment to complete UPF by 2025 for $6.5 billion is predicated on consistent and stable funding profiles. The Department will finalize the project's cost and schedule estimate in FY 2018. This notification satisfies the requirement of Section 3118 of the National Defense Authorization Act for Fiscal Year 2015.

The Critical Decision (CD) 2/3 approvals for the Main Process Building Subproject (MPB) (-04), Salvage and Accountability Building (SAB) Subproject (-09) and the Process Support Facilities (PSF) Subproject (-08) were rescheduled to the second quarter of FY 2018. CD-4s for the MPB, SAB and PSF Subprojects are scheduled for the fourth quarter of FY 2025. Estimates for these Subprojects are pre-CD-2, have been updated to reflect preliminary design, and are subject to change based on design maturity until the baselines are established in FY 2018.

The MPB Subproject CD-3A for Site Preparation and Long Lead Procurements was approved on March 30, 2016. The MPB Subproject CD-3B for Long Lead Procurements was approved on January 13, 2017. The MPB Subproject CD-3C for Long Lead Procurements identified in the FY 2017 CPDS was incorporated into the CD-3B approval.

The CD-2/3 for the Mechanical Electrical Building (MEB) Subproject (-06) CD-2/3 was approved on December 13, 2016 with a TPC of $284 million compared to $600 million at the top end of the range as identified in the FY 2017 CPDS. As design and acquisition strategies matured, site preparation and electrical work realignment from the MEB to the MPB & Substation Subprojects was completed.

The CD-2/3 for the Substation Subproject (-07) was approved on September 14, 2016 with a TPC of $60 million.

Summary

The most recent DOE Order 413.3B approved Critical Decision (CD) for the overall project is CD-1 reaffirmation that was approved on June 8, 2012 with a preliminary cost range of $4.2 billion to $6.5 billion and CD-4 of fourth quarter of FY 2025. The cost tables below provide numbers at the upper end of the range for subprojects without a CD-2/3 approval.

The UPF consists of processing capabilities for enriched uranium casting, oxide production, and salvage and accountability operations. The UPF project includes a Main Process Building (MPB), a Salvage and Accountability Building (SAB), a Mechanical Electrical Building (MEB), and various support facilities. Constructing multiple facilities allows each facility to be designed and constructed with a level of safety and security appropriate for the hazards of each operation. The MPB will house the casting and oxide production capabilities as well as furnaces, repackaging, and non-destructive analysis. The SAB will house calcination and leaching, chemical recovery, maintenance, and decontamination areas. The MEB will house the utility support systems for both the MPB and the SAB. Support buildings will include a construction support building, truck bay/loading dock, process support facility (PSF), fire system building, and a connector to High Enriched Uranium Manufacturing Facility (HEUMF). The UPF project will be considered complete upon successful completion of the described subset of Building 9212 capabilities.

FY 2018 funds will be used for construction/procurements primarily for, but not limited to, the MPB, MEB, and SAB subprojects. The CPDS includes updated estimates for the MPB, SAB and PSF Subprojects based on preliminary design information. Bottoms-up estimates will be updated to establish the MPB Subproject, SAB Subproject and PSF Subproject baselines. The federal project director will ensure the project's Work Breakdown Structure is appropriately aligned to support the critical decision strategy. Subproject descriptions are included in Section 4.

Consistent with NNSA's increased emphasis on project management rigor and Department policy, subproject Total Project Costs (TPCs) and baseline schedules will not be approved until the designs are sufficiently mature to support a credible cost and schedule estimate. NNSA will not establish a performance baseline for the SAB Subproject or MPB Subproject, which contain the nuclear facilities, until the buildings' designs are 90% complete.

Site Readiness Subproject (06-D-141-01): Site Readiness Subproject received CD-4 on February 27, 2015. The project was completed under budget and CD-4 was achieved on schedule.

Main Process Building Subproject (06-D-141-04): The Main Process Building (MPB) subproject CD-2/3 approval is scheduled for the second quarter of FY 2018, and the top end of the cost range is estimated at $4.8 billion which includes UPF design, site preparation, and long lead procurements as well as construction of the MPB nuclear facility. The projected CD-4 date is the fourth quarter of FY 2025. The CD-3A for Long Lead Procurement and Site Preparation was approved on March 30, 2016. The CD-3B for Long Lead Procurements was approved on January 13, 2017.

Site Infrastructure and Services (SIS) Subproject (06-D-141-05): The SIS Subproject CD-2/3 was approved in March 2015, at a cost of $78.5 million with a CD-4 date of April 2018.

Mechanical Electrical Building (MEB) Subproject (06-D-141-06): The Mechanical Electrical Building Subproject CD- 2/3 was approved on December 13, 2016 at a cost of $284 million with a CD-4 date of January 2022.

Substation Subproject (06-D-141-07): The Substation Subproject CD-2/3 was approved on September 14, 2016, at a cost of $60 million with a CD-4 date of June 2020.

Process Support Facilities Subproject (06-D-141-08): The Process Support Facilities Subproject CD-2/3 approval is scheduled for the second quarter of FY 2018, and the top end of the cost range is estimated at $121 million. The projected CD-4 date is the fourth quarter of FY 2025.

Salvage and Accountability Building Subproject (06-D-141-09): The Salvage and Accountability Building Subproject CD-2/3 approval is scheduled for the second quarter of FY 2018, and the top end of the cost range is estimated at $1.1 billion. The projected CD-4 date is the fourth quarter of FY 2025. Long lead equipment for the SAB Subproject was procured as part of the MPB Subproject CD-3B and will be included in the SAB TPC.

FY 2018 activities include completing the design for the nuclear buildings and associated support structures, procurements, and construction of subprojects. Project activities include approving the final CD-2/3 packages for the UPF project which will set the project's performance baseline upon approval in accordance with DOE O 413.3B.

A Level 4 PMCDP qualified Federal Project Director has been assigned to this project and has approved this CPDS. A Federal Project Director at the appropriate level has been assigned to each subproject. Project funds may be used by the Federal Project Director for contracted support services for the federal project team.

As represented since the FY 2012 request, design, construction and Other Project Costs (OPC) will continue to be executed through the line item funding. After October 1, 2011, OPC work has been and will only be performed using funding specifically appropriated by Congress for the project.

Critical Milestone History

Overall Project (06-D-141)

(fiscal quarter or date)

	CD-0	Conceptual Design Complete	CD-1	CD-2	Final Design Complete	CD-3	D&D Complete	CD-4
FY 2011	12/17/2004		7/25/2007	TBD	2QFY2014	TBD	TBD	TBD
FY 2012	12/17/2004		7/25/2007	4QFY2013	2QFY2014	4QFY2013	TBD	TBD
FY 2013	12/17/2004		7/25/2007	4QFY2013	2QFY2014	4QFY2013	N/A	4QFY2022
FY 2014	12/17/2004		6/8/2012	3Q FY2014	4QFY2015	3QFY2015	N/A	TBD
FY 2015	12/17/2004		6/8/2012	TBD	TBD	TBD	N/A	TBD
FY 2016	12/17/2004	2/9/2006	6/8/2012	TBD	TBD	TBD	N/A	TBD
FY 2017	12/17/2004	6/24/2015	6/8/2012	4QFY2017	4QFY2017	4QFY2017	N/A	4QFY2025
FY 2018	12/17/2004	6/24/2015	6/8/2012	2QFY2018	4QFY2017	2QFY2018	N/A	4QFY2025

Site Readiness Subproject (06-D-141-01)

(fiscal quarter or date)

	CD-0	Conceptual Design Complete	CD-1	CD-2	Final Design Complete	CD-3	D&D Complete	CD-4
FY 2014 PB	12/17/2004		6/8/2012	1/29/2013	1/29/2013	1/29/2013	N/A	2QFY2015
FY 2015	12/17/2004		6/8/2012	1/29/2013	1/29/2013	1/29/2013	N/A	2QFY2015
FY 2016	12/17/2004	2/9/2006	6/8/2012	1/29/2013	1/29/2013	1/29/2013	N/A	2QFY2015
FY 2017	12/17/2004	2/9/2006	6/8/2012	1/29/2013	1/29/2013	1/29/2013	N/A	2/27/2015
FY 2018	12/17/2004	2/9/2006	6/8/2012	1/29/2013	1/29/2013	1/29/2013	N/A	2/27/2015

Main Process Building Subproject (06-D-141-04)

(fiscal quarter or date)

	CD-0	Conceptual Design Complete	CD-1	CD-2	Final Design Complete	CD-3	D&D Complete	CD-4
FY 2014	12/17/2004		7/25/2007	3QFY2014	4QFY2015	3QFY2015	N/A	TBD
FY 2015	12/17/2004		7/25/2007	TBD	TBD	TBD	N/A	TBD
FY 2016	12/17/2004	2/9/2006	6/8/2012	TBD	TBD	TBD	N/A	TBD
FY 2017	12/17/2004	6/24/2015	6/8/2012	4QFY2017	4QFY2017	4QFY2017	N/A	4QFY2025
FY 2018	12/17/2004	6/24/2015	6/8/2012	2QFY2018	4QFY2017	2QFY2018	N/A	4QFY2025

Site Infrastructure and Services Subproject (06-D-141-05)

(fiscal quarter or date)

	CD-0	Conceptual Design Complete	CD-1	CD-2	Final Design Complete	CD-3	D&D Complete	CD-4
FY 2015	12/17/2004		7/25/2007	4QFY2014	4QFY2013	4QFY2014	N/A	4QFY2016
FY 2016	12/17/2004	2/9/2006	6/8/2012	2QFY2015	3QFY2015	2QFY2015	N/A	4QFY2016
FY 2017 PB	12/17/2004	2/9/2006	6/8/2012	3/12/2015	3/12/2015	3/12/2015	N/A	4/28/2018
FY 2018	12/17/2004	2/9/2006	6/8/2012	3/12/2015	3/12/2015	3/12/2015	N/A	4/28/2018

Mechanical Electrical Building (MEB) Subproject (06-D-141-06)

(fiscal quarter or date)

	CD-0	Conceptual Design Complete	CD-1	CD-2	Final Design Complete	CD-3	D&D Complete	CD-4
FY 2017	12/17/2004	6/24/2015	6/8/2012	2QFY2017	4QFY2017	2QFY2017	N/A	4QFY2021
FY 2018 PB	12/17/2004	6/24/2015	6/8/2012	12/13/2016	4QFY2017	12/13/2016	N/A	1/31/2022

Substation Subproject (06-D-141-07)

(fiscal quarter or date)

	CD-0	Conceptual Design Complete	CD-1	CD-2	Final Design Complete	CD-3	D&D Complete	CD-4
FY 2017	12/17/2004	6/24/2015	6/8/2012	4QFY2016	4QFY2016	4QFY2016	N/A	1QFY2019
FY 2018 PB	12/17/2004	6/24/2015	6/8/2012	9/14/2016	9/30/2017	9/14/2016	N/A	6/30/2020

Process Support Facilities Subproject (06-D-141-08) [a]

(fiscal quarter or date)

	CD-0	Conceptual Design Complete	CD-1	CD-2	Final Design Complete	CD-3	D&D Complete	CD-4
FY 2017	12/17/2004	6/24/2015	6/8/2012	3QFY2017	3QFY2017	3QFY2017	N/A	4QFY2021
FY 2018	12/17/2004	6/24/2015	6/8/2012	2QFY2018	4QFY2017	2QFY2018	N/A	4QFY2025

[a]The schedule is estimated and consistent with the high end of the schedule range.

Salvage and Accountability Building Subproject (06-D-141-09) [a]

(fiscal quarter or date)

	CD-0	Conceptual Design Complete	CD-1	CD-2	Final Design Complete	CD-3	D&D Complete	CD-4
FY 2017	12/17/2004	6/24/2015	6/8/2012	4QFY2017	4QFY2017	4QFY2017	N/A	4QFY2025
FY 2018	12/17/2004	6/24/2015	6/8/2012	2QFY2018	4QFY2017	2QFY2018	N/A	4QFY2025

CD-0 – Approve Mission Need for a construction project with a conceptual scope and cost range
Conceptual Design Complete – Actual date the conceptual design was completed (if applicable)
CD-1 – Approve Design Scope and Project Cost and Schedule Ranges
CD-2 – Approve Project Performance Baseline
Final Design Complete – Estimated/Actual date the project design will be/was complete(d)
CD-3 – Approve Start of Construction
D&D Complete –Completion of D&D work (see Section 9)
CD-4 – Approve Start of Operations or Project Closeout
PB – Indicates the Performance Baseline

	MPB CD-3A	MPB CD-3B	MPB CD-3C	Substation CD-3A
FY 2017	2Q FY 2016	1Q FY 2017	1Q FY 2017	3Q FY 2016
FY 2018	3/30/2016	1/13/2017	N/A	N/A

MPB CD-3A – Long Lead Procurement for site preparation and long lead procurements
MPB CD-3B – Long Lead Procurements

[a] The schedule is estimated and consistent with the high end of the schedule range.

Project Cost History

Overall Project (06-D-141-01 through 06-D-141-09)

(dollars in thousands)

	TEC, Design	TEC, Construction	TEC, Total	OPC, Except D&D	OPC, D&D	OPC, Total	TPC
FY 2011	351,149	935,000-1,604,000	1,124,000-1,928,000	276,000-472,000	TBD	TBD	1,400,000-3,500,000
FY 2012	528,690	3,174,779-5,320,310	3,703,000-5,849,000	497,000-651,000	N/A	497,000-651,000	4,200,000-6,500,000
FY 2013	566,192	3,136,808-5,150,808	3,703,000-5,717,000	497,000-783,000	N/A	497,000-783,000	4,200,000-6,500,000
FY 2014	1,164,000	TBD	TBD	TBD	N/A	TBD	TBD
FY 2015	TBD	TBD	TBD	TBD	N/A	TBD	TBD
FY 2016	TBD	TBD	TBD	TBD	N/A	TBD	TBD
FY 2017	1,880,000	4,103,000	5,983,000	517,000	0	517,000	6,500,000
FY 2018	1,926,000	4,148,500	6,074,500	425,500	0	425,500	6,500,000

Site Readiness Subproject (06-D-141-01)

(dollars in thousands)

	TEC, Design	TEC, Construction	TEC, Total	OPC, Except D&D	OPC, D&D	OPC, Total	TPC
FY 2015	N/A	64,000	64,000	1,000	N/A	1,000	65,000
FY 2016		64,000	64,000	1,000	N/A	1,000	65,000
FY 2017	0	43,277	43,277	0	0	0	43,277
FY 2018	0	43,277	43,277	0	0	0	43,277

Main Process Building Subproject (06-D-141-04)

(dollars in thousands)

	TEC, Design	TEC, Construction	TEC, Total	OPC, Except D&D	OPC, D&D	OPC, Total	TPC
FY 2015	TBD	TBD	TBD	TBD	N/A	TBD	TBD
FY 2016	TBD	TBD	TBD	TBD	N/A	TBD	TBD
FY 2017	1,880,000	2,138,723	4,018,723	319,500	0	319,500	4,338,223
FY 2018[a]	1,926,000	2,511,973	4,437,973	390,000	0	390,000	4,827,973

[a] Cost is at the high end of the cost range adjusted to balance the overall project to $6.5 billion.

Site Infrastructure and Services Subproject (06-D-141-05)

(dollars in thousands)

	TEC, Design	TEC, Construction	TEC, Total	OPC, Except D&D	OPC, D&D	OPC, Total	TPC
FY 2015	N/A	58,000	58,000	1,500	N/A	1,500	59,500
FY 2016	N/A	84,500	84,500	500	N/A	500	85,000
FY 2017	0	78,000	78,000	500	0	500	78,500
FY 2018	0	78,000	78,000	500	0	500	78,500

Mechanical Electrical Building (MEB) Subproject (06-D-141-06)

(dollars in thousands)

	TEC, Design	TEC, Construction	TEC, Total	OPC, Except D&D	OPC, D&D	OPC, Total	TPC
FY 2017	0	540,000	540,000	60,000	0	60,000	600,000
FY 2018	0	284,000	284,000	0	0	0	284,000

Substation Subproject (06-D-141-07)

(dollars in thousands)

	TEC, Design	TEC, Construction	TEC, Total	OPC, Except D&D	OPC, D&D	OPC, Total	TPC
FY 2017	0	48,000	48,000	2,000	0	2,000	50,000
FY 2018	0	60,000	60,000	0	0	0	60,000

Process Support Facilities Subproject (06-D-141-08)

(dollars in thousands)

	TEC, Design	TEC, Construction	TEC, Total	OPC, Except D&D	OPC, D&D	OPC, Total	TPC
FY 2017	0	55,000	55,000	5,000	0	5,000	60,000
FY 2018	0	111,000	111,000	10,000	0	10,000	121,000

Salvage and Accountability Building Subproject (06-D-141-09)

(dollars in thousands)

	TEC, Design	TEC, Construction	TEC, Total	OPC, Except D&D	OPC, D&D	OPC, Total	TPC
FY 2017	0	1,200,000	1,200,000	130,000	0	130,000	1,330,000
FY 2018	0	1,060,250	1,060,250	25,000	0	25,000	1,085,250

Project Scope and Justification

Scope

The UPF Project, which consists of a series of industrial and nuclear buildings and supporting infrastructure, is a major system acquisition that was selected in the Record of Decision for the Complex Transformation Supplemental Programmatic Environmental Impact Statement to ensure the long-term viability, safety, and security of the EU capability at the Y-12 National Security Complex. Within budget constraints, the UPF project focuses on modernizing uranium processing capabilities at Y-12 to reduce safety risk. The UPF project provides new buildings to replace the Building 9212 capabilities for Highly Enriched Uranium (HEU) casting, oxide production, recovery, decontamination and assay. Coordination between Headquarters Acquisition and Project Management, the Uranium Program Manager, the NNSA Production Office and the UPF Project Office is essential as a new uranium mission strategy and implementing plan are developed to define how the uranium capabilities are transitioned, relocated, sustained and/or replaced.

The goals and objectives of the UPF Project are to support the following modernization strategy:

- Ensure the long-term capability and improve the reliability of EU operations;
- Replace deteriorating, end-of-life buildings with modern manufacturing buildings;
- Significantly improve the health and safety posture for workers and the public by replacing administrative controls with engineered controls to manage the risks related to worker safety, criticality safety, fire protection, and environmental compliance.

The UPF project consists of the following subprojects:

Site Readiness Subproject (06-D-141-01): The Site Readiness Subproject scope included Bear Creek Road relocation, including a bridge overpass of the haul road; installation of potable water lines paralleling the new road; electrical line demolition to make way for the road and clear the construction site; electrical line and communication cable installation; preparation of the West Borrow area to receive excess-soil and preparation and maintenance of a spoil area for wet soil; extension of an existing haul road for access to the construction site; and jack-and-bore installation of casings for future utilities.

Main Process Building Subproject (06-D-141-04): The MPB will house the casting and oxide production capabilities. It also contains nondestructive analysis and waste preparations, furnaces and repacking, and spaces needed for process support such as the shift manager’s office, restrooms, and other personnel-related rooms. The MPB will be constructed to nuclear standards commensurate with high-hazard materials and security for the processes to be carried out within. The MPB Subproject will include the construction of the HEUMF connector, and the new Perimeter Intrusion Detection and Assessment System surrounding the UPF campus and support buildings. Design costs for the UPF project are included in the Main Process Building Subproject baseline, as design costs are not tracked for each individual UPF subproject.

> **Site Preparation and Long Lead Procurements, CD-3A:** Includes excavation and fill for the MPB, SAB and the MEB; installation of temporary facilities, power, storm water and sanitary sewers; and long lead procurements of tower cranes and rebar for the MEB slab.

Long Lead Procurements, CD-3B: Includes long lead gloveboxes, skids and select long lead procurements for structural steel, rebar, embeds and specialty items. Procurement costs will be allocated to the MPB and SAB Subprojects.

Long Lead Skids, CD-3C: The CD-3C was cancelled in 2016.

Site Infrastructure and Services Subproject (06-D-141-05): The SIS Subproject is under construction. Completed SIS scope includes demolition of Building 9107 and its hillside, installation of haul road security features, completion of a sedimentation basin and a Concrete Batch Plant. Ongoing activities includes the construction of the Construction Support Building.

Mechanical Electrical Building (MEB) Subproject (06-D-141-06): The Mechanical Electrical Building will house the utility support systems for both the Main Process Building and the Salvage and Accountability Building. The Mechanical Electrical Building Subproject will construct a facility and install the utility equipment and support systems required by both the Main Process Building (MPB) and the Salvage and Accountability Building (SAB). The MEB will be a stand-alone building housing mechanical; electrical; heating, ventilating, and air conditioning; utility equipment; and support systems. The MEB will be constructed to nonnuclear commercial industrial standards. This subproject includes support buildings including leased temporary and permanent construction support facilities.

Substation Subproject (06-D-141-07): The Substation Subproject provides for the installation of the 161 kV Main Electrical Substation for the Uranium Processing Facility Project and capacity for the rest of the Y-12 plant. The Substation will provide electrical power from the Tennessee Valley Authority (TVA) 161kV transmission system. The Substation Subproject includes all equipment, facilities or structures needed for a fully operational substation including the high voltage superstructure, control house buildings, site work, equipment foundations, oil containment system, fencing, outdoor lighting, grounding system, and all underground raceways, conduits and cable trenches, transmission lines, access road and fire protection for the substation. The CD-3A for long lead equipment was cancelled in 2016.

Process Support Facilities Subproject (06-D-141-08): The Process Support Facilities Subproject provides facilities for the chilled water, instrument air, demineralized water, waste management, and chemical and gas storage needed to support the MPB and SAB.

Salvage and Accountability Building Subproject (06-D-141-09): The SAB will contain the following processes: waste preparation, decontamination, nondestructive analysis, the clean and contaminated shops, chemical recovery, calcination and leaching, electronics and calibration maintenance, filter room, and personnel-related rooms. The SAB will be constructed to standards commensurate with the radioactive hazard and security requirements for the materials and processes contained within. This subproject includes support buildings including a fire tank pump building as well as the Personnel Support Building which provides personnel access and monitoring station, truck bay, loading dock and material access. Long lead equipment purchases associated with the SAB Subproject will be allocated to the SAB TPC.

Justification

The UPF Project is needed to ensure the long-term viability, safety, and security of the Enriched Uranium (EU) capability in the United States. The UPF Project will support the Nation's nuclear weapons stockpile, down blending of EU in support of nonproliferation, and provide uranium as feedstock for fuel for naval reactors. Currently these capabilities reside in aged and "genuinely decrepit" facilities as noted by the Perry Commission. There is substantial risk that the existing facilities will continue to deteriorate to the point of significant impact to Defense Programs, Defense Nuclear Nonproliferation, and Naval Reactors programs. The impacts could result in loss of the U.S. capability to maintain the nuclear weapons stockpile through life extension programs, shutdown of the U.S. Navy nuclear powered fleet due to lack of EU fuel feedstock materials, and impact to the Defense Nuclear Nonproliferation program's ability to reduce the enrichment level of foreign research reactors through supply of lower enrichment fuels manufactured at Y-12. The risk of inadvertent or accidental shutdown of the existing facilities is high and may occur prior to completion and startup of the UPF Project.

The project is being conducted in accordance with the project management requirements in DOE O 413.3B, Program and Project Management for the Acquisition of Capital Assets. Consistent with DOE O 413.3B, Earned Value information for all subprojects and the UPF design effort will be reported in the Project Assessment and Reporting System (PARS II). Funds appropriated under this data sheet may be used for independent reviews, assessments and contractor support to the Federal Project Director and integrated project team in oversight of the planning and execution of this project.

Financial Schedule

Site Readiness Subproject (06-D-141-01)

(dollars in thousands)

	Appropriations	Plan	Obligations	Costs
Total Estimated Cost (TEC)				
Design				
FY 2005	N/A	0	0	0
FY 2006	N/A	0	0	0
FY 2007	N/A	0	0	0
FY 2008	N/A	0	0	0
FY 2009	N/A	0	0	0
FY 2010	N/A	0	0	0
FY 2011	N/A	0	0	0
FY 2012	N/A	0	0	0
FY 2013	N/A	0	0	0
FY 2014	N/A	0	0	0
FY 2015	N/A	0	0	0
FY 2016	N/A	0	0	0
FY 2017	N/A	0	0	0
FY 2018	N/A	0	0	0
FY 2019	N/A	0	0	0
FY 2020	N/A	0	0	0
FY 2021	N/A	0	0	0
FY 2022	N/A	0	0	0
FY 2023	N/A	0	0	0
FY 2024	N/A	0	0	0
FY 2025	N/A	0	0	0
Total, Design	**N/A**	**0**	**0**	**0**
Construction				
FY 2005	N/A	0	0	0
FY 2006	N/A	0	0	0
FY 2007	N/A	0	0	0
FY 2008	N/A	0	0	0
FY 2009	N/A	0	0	0
FY 2010	N/A	0	0	0
FY 2011	N/A	0	0	0
FY 2012	N/A	0	0	0
FY 2013	N/A	43,277	43,277	5,242
FY 2014	N/A	0	0	25,928
FY 2015	N/A	0	0	12,107
FY 2016	N/A	0	0	0
FY 2017	N/A	0	0	0
FY 2018	N/A	0	0	0
FY 2019	N/A	0	0	0

(dollars in thousands)

	Appropriations	Plan	Obligations	Costs
FY 2020	N/A	0	0	0
FY 2021	N/A	0	0	0
FY 2022	N/A	0	0	0
FY 2023	N/A	0	0	0
FY 2024	N/A	0	0	0
FY 2025	N/A	0	0	0
Total, Construction	**N/A**	**43,277**	**43,277**	**43,277**
TEC				
FY 2005	N/A	0	0	0
FY 2006	N/A	0	0	0
FY 2007	N/A	0	0	0
FY 2008	N/A	0	0	0
FY 2009	N/A	0	0	0
FY 2010	N/A	0	0	0
FY 2011	N/A	0	0	0
FY 2012	N/A	0	0	0
FY 2013	N/A	43,277	43,277	5,242
FY 2014	N/A	0	0	25,928
FY 2015	N/A	0	0	12,107
FY 2016	N/A	0	0	0
FY 2017	N/A	0	0	0
FY 2018	N/A	0	0	0
FY 2019	N/A	0	0	0
FY 2020	N/A	0	0	0
FY 2021	N/A	0	0	0
FY 2022	N/A	0	0	0
FY 2023	N/A	0	0	0
FY 2024	N/A	0	0	0
FY 2025	N/A	0	0	0
Total, TEC	**N/A**	**43,277**	**43,277**	**43,277**
Other Project Cost (OPC)				
OPC except D&D				
FY 2005	N/A	0	0	0
FY 2006	N/A	0	0	0
FY 2007	N/A	0	0	0
FY 2008	N/A	0	0	0
FY 2009	N/A	0	0	0
FY 2010	N/A	0	0	0
FY 2011	N/A	0	0	0
FY 2012	N/A	0	0	0
FY 2013	N/A	0	0	0
FY 2014	N/A	0	0	0
FY 2015	N/A	0	0	0

(dollars in thousands)

	Appropriations	Plan	Obligations	Costs
FY 2016	N/A	0	0	0
FY 2017	N/A	0	0	0
FY 2018	N/A	0	0	0
FY 2019	N/A	0	0	0
FY 2020	N/A	0	0	0
FY 2021	N/A	0	0	0
FY 2022	N/A	0	0	0
FY 2023	N/A	0	0	0
FY 2024	N/A	0	0	0
FY 2025	N/A	0	0	0
Total, OPC	**N/A**	**0**	**0**	**0**
Total Project Cost (TPC)				
FY 2005	N/A	0	0	0
FY 2006	N/A	0	0	0
FY 2007	N/A	0	0	0
FY 2008	N/A	0	0	0
FY 2009	N/A	0	0	0
FY 2010	N/A	0	0	0
FY 2011	N/A	0	0	0
FY 2012	N/A	0	0	0
FY 2013	N/A	43,277	43,277	5,242
FY 2014	N/A	0	0	25,928
FY 2015	N/A	0	0	12,107
FY 2016	N/A	0	0	0
FY 2017	N/A	0	0	0
FY 2018	N/A	0	0	0
FY 2019	N/A	0	0	0
FY 2020	N/A	0	0	0
FY 2021	N/A	0	0	0
FY 2022	N/A	0	0	0
FY 2023	N/A	0	0	0
FY 2024	N/A	0	0	0
FY 2025	N/A	0	0	0
Total, TPC	**N/A**	**43,277**	**43,277**	**43,277**

Main Process Building Subproject (06-D-141-04)

	(dollars in thousands)			
	Appropriations	**Plan**	**Obligations**	**Costs**
Total Estimated Cost (TEC)				
Design				
FY 2005	N/A	0	0	0
FY 2006	N/A	5,000	5,000	0
FY 2007	N/A	5,000	5,000	677
FY 2008	N/A	38,583	38,583	33,950
FY 2009	N/A	90,622	90,622	79,184
FY 2010	N/A	94,000	94,000	80,959
FY 2011	N/A	114,786	114,786	109,855
FY 2012	N/A	160,194	160,109	170,700
FY 2013	N/A	269,506	269,463	192,389
FY 2014	N/A	304,000	300,000	198,448
FY 2015	N/A	257,000	240,000	256,866
FY 2016	N/A	298,000	285,596	274,536
FY 2017	N/A	289,309	322,841	355,640
FY 2018	N/A	0	0	172,796
FY 2019	N/A	0	0	0
FY 2020	N/A	0	0	0
FY 2021	N/A	0	0	0
FY 2022	N/A	0	0	0
FY 2023	N/A	0	0	0
FY 2024	N/A	0	0	0
FY 2025	N/A	0	0	0
Total, Design	**N/A**	**1,926,000**	**1,926,000**	**1,926,000**
Construction				
FY 2005	N/A	0	0	0
FY 2006	N/A	0	0	0
FY 2007	N/A	0	0	0
FY 2008	N/A	0	0	0
FY 2009	N/A	0	0	0
FY 2010	N/A	0	0	0
FY 2011	N/A	0	0	0
FY 2012	N/A	0	0	0
FY 2013	N/A	0	0	0
FY 2014	N/A	0	0	0
FY 2015	N/A	0	0	0
FY 2016	N/A	72,000	72,000	4,958
FY 2017	N/A	230,191	230,191	130,000
FY 2018	N/A	337,000	337,000	330,000
FY 2019	N/A	438,000	438,000	500,000
FY 2020	N/A	430,000	430,000	500,000
FY 2021	N/A	443,000	443,000	475,000
FY 2022	N/A	429,000	429,000	395,000

	Appropriations	Plan	Obligations	Costs
	(dollars in thousands)			
FY 2023	N/A	118,000	118,000	160,000
FY 2024	N/A	14,782	14,782	15,000
FY 2025	N/A	0	0	2,015
Total, Construction	**N/A**	**2,511,973**	**2,511,973**	**2,511,973**
TEC				
FY 2005	N/A	0	0	0
FY 2006	N/A	5,000	5,000	0
FY 2007	N/A	5,000	5,000	677
FY 2008	N/A	38,583	38,583	33,950
FY 2009	N/A	90,622	90,622	79,184
FY 2010	N/A	94,000	94,000	80,959
FY 2011	N/A	114,786	114,786	109,855
FY 2012	N/A	160,194	160,109	170,700
FY 2013	N/A	269,506	269,463	192,389
FY 2014	N/A	304,000	300,000	198,448
FY 2015	N/A	257,000	240,000	256,866
FY 2016	N/A	370,000	357,596	279,494
FY 2017	N/A	519,500	553,032	485,640
FY 2018	N/A	337,000	337,000	502,796
FY 2019	N/A	438,000	438,000	500,000
FY 2020	N/A	430,000	430,000	500,000
FY 2021	N/A	443,000	443,000	475,000
FY 2022	N/A	429,000	429,000	395,000
FY 2023	N/A	118,000	118,000	160,000
FY 2024	N/A	14,782	14,782	15,000
FY 2025	N/A	0	0	2,015
Total, TEC	**N/A**	**4,437,973**	**4,437,973**	**4,437,973**
Other Project Cost (OPC)				
OPC except D&D				
FY 2005	N/A	12,113	12,113	12,113
FY 2006	N/A	7,809	7,809	7,809
FY 2007	N/A	10,082	10,082	10,082
FY 2008	N/A	11,730	11,730	11,730
FY 2009	N/A	14,000	14,000	14,000
FY 2010	N/A	20,500	20,500	20,500
FY 2011	N/A	18,894	18,894	18,894
FY 2012	N/A	0	0	0
FY 2013	N/A	0	0	0
FY 2014	N/A	0	0	0
FY 2015	N/A	0	0	0
FY 2016	N/A	0	0	0
FY 2017	N/A	0	0	0
FY 2018	N/A	1,000	1,000	500

	(dollars in thousands)			
	Appropriations	**Plan**	**Obligations**	**Costs**
FY 2019	N/A	2,000	2,000	1,500
FY 2020	N/A	10,000	10,000	6,000
FY 2021	N/A	10,000	10,000	15,000
FY 2022	N/A	45,000	45,000	30,000
FY 2023	N/A	186,750	105,000	90,000
FY 2024	N/A	40,122	100,000	100,000
FY 2025	N/A	0	21,872	51,872
Total, OPC except D&D	**N/A**	**390,000**	**390,000**	**390,000**
Total Project Cost (TPC)				
FY 2005	N/A	12,113	12,113	12,113
FY 2006	N/A	12,809	12,809	7,809
FY 2007	N/A	15,082	15,082	10,759
FY 2008	N/A	50,313	50,313	45,680
FY 2009	N/A	104,622	104,622	93,184
FY 2010	N/A	114,500	114,500	101,459
FY 2011	N/A	133,680	133,680	128,749
FY 2012	N/A	160,194	160,109	170,700
FY 2013	N/A	269,506	269,463	192,389
FY 2014	N/A	304,000	300,000	198,448
FY 2015	N/A	257,000	240,000	256,866
FY 2016	N/A	370,000	357,596	279,494
FY 2017	N/A	519,500	553,032	485,640
FY 2018	N/A	338,000	338,000	503,296
FY 2019	N/A	440,000	440,000	501,500
FY 2020	N/A	440,000	440,000	506,000
FY 2021	N/A	453,000	453,000	490,000
FY 2022	N/A	474,000	474,000	425,000
FY 2023	N/A	304,750	223,000	250,000
FY 2024	N/A	54,904	114,782	115,000
FY 2025	N/A	0	21,872	53,887
Total, TPC	**N/A**	**4,827,973**	**4,827,973**	**4,827,973**

Site Infrastructure and Services Subproject (06-D-141-05)

(dollars in thousands)

	Appropriations	Plan	Obligations	Costs
Total Estimated Cost (TEC)				
Design				
FY 2005	N/A	0	0	0
FY 2006	N/A	0	0	0
FY 2007	N/A	0	0	0
FY 2008	N/A	0	0	0
FY 2009	N/A	0	0	0
FY 2010	N/A	0	0	0
FY 2011	N/A	0	0	0
FY 2012	N/A	0	0	0
FY 2013	N/A	0	0	0
FY 2014	N/A	0	0	0
FY 2015	N/A	0	0	0
FY 2016	N/A	0	0	0
FY 2017	N/A	0	0	0
FY 2018	N/A	0	0	0
FY 2019	N/A	0	0	0
FY 2020	N/A	0	0	0
FY 2021	N/A	0	0	0
FY 2022	N/A	0	0	0
FY 2023	N/A	0	0	0
FY 2024	N/A	0	0	0
FY 2025	N/A	0	0	0
Total, Design	**N/A**	**0**	**0**	**0**
Construction				
FY 2005	N/A	0	0	0
FY 2006	N/A	0	0	0
FY 2007	N/A	0	0	0
FY 2008	N/A	0	0	0
FY 2009	N/A	0	0	0
FY 2010	N/A	0	0	0
FY 2011	N/A	0	0	0
FY 2012	N/A	0	0	0
FY 2013	N/A	0	0	0
FY 2014	N/A	0	0	0
FY 2015	N/A	78,000	78,000	8,746
FY 2016	N/A	0	0	26,875
FY 2017	N/A	0	0	42,379
FY 2018	N/A	0	0	0
FY 2019	N/A	0	0	0
FY 2020	N/A	0	0	0
FY 2021	N/A	0	0	0
FY 2022	N/A	0	0	0

(dollars in thousands)

	Appropriations	Plan	Obligations	Costs
FY 2023	N/A	0	0	0
FY 2024	N/A	0	0	0
FY 2025	N/A	0	0	0
Total, Construction	**N/A**	**78,000**	**78,000**	**78,000**
TEC				
FY 2005	N/A	0	0	0
FY 2006	N/A	0	0	0
FY 2007	N/A	0	0	0
FY 2008	N/A	0	0	0
FY 2009	N/A	0	0	0
FY 2010	N/A	0	0	0
FY 2011	N/A	0	0	0
FY 2012	N/A	0	0	0
FY 2013	N/A	0	0	0
FY 2014	N/A	0	0	0
FY 2015	N/A	78,000	78,000	8,746
FY 2016	N/A	0	0	26,875
FY 2017	N/A	0	0	42,379
FY 2018	N/A	0	0	0
FY 2019	N/A	0	0	0
FY 2020	N/A	0	0	0
FY 2021	N/A	0	0	0
FY 2022	N/A	0	0	0
FY 2023	N/A	0	0	0
FY 2024	N/A	0	0	0
FY 2025	N/A	0	0	0
Total, TEC	**N/A**	**78,000**	**78,000**	**78,000**
Other Project Cost (OPC)				
OPC except D&D				
FY 2005	N/A	0	0	0
FY 2006	N/A	0	0	0
FY 2007	N/A	0	0	0
FY 2008	N/A	0	0	0
FY 2009	N/A	0	0	0
FY 2010	N/A	0	0	0
FY 2011	N/A	0	0	0
FY 2012	N/A	0	0	0
FY 2013	N/A	0	0	0
FY 2014	N/A	0	0	0
FY 2015	N/A	0	0	0
FY 2016	N/A	0	0	0
FY 2017	N/A	500	500	500

	(dollars in thousands)			
	Appropriations	**Plan**	**Obligations**	**Costs**
FY 2018	N/A	0	0	0
FY 2019	N/A	0	0	0
FY 2020	N/A	0	0	0
FY 2021	N/A	0	0	0
FY 2022	N/A	0	0	0
FY 2023	N/A	0	0	0
FY 2024	N/A	0	0	0
FY 2025	N/A	0	0	0
Total, OPC except D&D	**N/A**	**500**	**500**	**500**
Total Project Cost (TPC)				
FY 2005	N/A	0	0	0
FY 2006	N/A	0	0	0
FY 2007	N/A	0	0	0
FY 2008	N/A	0	0	0
FY 2009	N/A	0	0	0
FY 2010	N/A	0	0	0
FY 2011	N/A	0	0	0
FY 2012	N/A	0	0	0
FY 2013	N/A	0	0	0
FY 2014	N/A	0	0	0
FY 2015	N/A	78,000	78,000	8,746
FY 2016	N/A	0	0	26,875
FY 2017	N/A	500	500	42,879
FY 2018	N/A	0	0	0
FY 2019	N/A	0	0	0
FY 2020	N/A	0	0	0
FY 2021	N/A	0	0	0
FY 2022	N/A	0	0	0
FY 2023	N/A	0	0	0
FY 2024	N/A	0	0	0
FY 2025	N/A	0	0	0
Total, TPC	**N/A**	**78,500**	**78,500**	**78,500**

Mechanical Electrical Building (MEB) Subproject (06-D-141-06)

(dollars in thousands)

	Appropriations	Plan	Obligations	Costs
Total Estimated Cost (TEC)				
Design				
FY 2005	N/A	0	0	0
FY 2006	N/A	0	0	0
FY 2007	N/A	0	0	0
FY 2008	N/A	0	0	0
FY 2009	N/A	0	0	0
FY 2010	N/A	0	0	0
FY 2011	N/A	0	0	0
FY 2012	N/A	0	0	0
FY 2013	N/A	0	0	0
FY 2014	N/A	0	0	0
FY 2015	N/A	0	0	0
FY 2016	N/A	0	0	0
FY 2017	N/A	0	0	0
FY 2018	N/A	0	0	0
FY 2019	N/A	0	0	0
FY 2020	N/A	0	0	0
FY 2021	N/A	0	0	0
FY 2022	N/A	0	0	0
FY 2023	N/A	0	0	0
FY 2024	N/A	0	0	0
FY 2025	N/A	0	0	0
Total, Design	**N/A**	**0**	**0**	**0**
Construction				
FY 2005	N/A	0	0	0
FY 2006	N/A	0	0	0
FY 2007	N/A	0	0	0
FY 2008	N/A	0	0	0
FY 2009	N/A	0	0	0
FY 2010	N/A	0	0	0
FY 2011	N/A	0	0	0
FY 2012	N/A	0	0	0
FY 2013	N/A	0	0	0
FY 2014	N/A	0	0	0
FY 2015	N/A	0	0	0
FY 2016	N/A	0	0	0
FY 2017	N/A	55,000	55,000	50,000
FY 2018	N/A	120,000	120,000	115,000
FY 2019	N/A	109,000	109,000	70,000

(dollars in thousands)

	Appropriations	Plan	Obligations	Costs
FY 2020	N/A	0	0	45,000
FY 2021	N/A	0	0	4,000
FY 2022	N/A	0	0	0
FY 2023	N/A	0	0	0
FY 2024	N/A	0	0	0
FY 2025	N/A	0	0	0
Total, Construction	**N/A**	**284,000**	**284,000**	**284,000**
TEC				
FY 2005	N/A	0	0	0
FY 2006	N/A	0	0	0
FY 2007	N/A	0	0	0
FY 2008	N/A	0	0	0
FY 2009	N/A	0	0	0
FY 2010	N/A	0	0	0
FY 2011	N/A	0	0	0
FY 2012	N/A	0	0	0
FY 2013	N/A	0	0	0
FY 2014	N/A	0	0	0
FY 2015	N/A	0	0	0
FY 2016	N/A	0	0	0
FY 2017	N/A	55,000	55,000	50,000
FY 2018	N/A	120,000	120,000	115,000
FY 2019	N/A	109,000	109,000	70,000
FY 2020	N/A	0	0	45,000
FY 2021	N/A	0	0	4,000
FY 2022	N/A	0	0	0
FY 2023	N/A	0	0	0
FY 2024	N/A	0	0	0
FY 2025	N/A	0	0	0
Total, TEC	**N/A**	**284,000**	**284,000**	**284,000**
Other Project Cost (OPC)				
OPC except D&D				
FY 2005	N/A	0	0	0
FY 2006	N/A	0	0	0
FY 2007	N/A	0	0	0
FY 2008	N/A	0	0	0
FY 2009	N/A	0	0	0
FY 2010	N/A	0	0	0
FY 2011	N/A	0	0	0
FY 2012	N/A	0	0	0
FY 2013	N/A	0	0	0
FY 2014	N/A	0	0	0
FY 2015	N/A	0	0	0

	(dollars in thousands)			
	Appropriations	**Plan**	**Obligations**	**Costs**
FY 2016	N/A	0	0	0
FY 2017	N/A	0	0	0
FY 2018	N/A	0	0	0
FY 2019	N/A	0	0	0
FY 2020	N/A	0	0	0
FY 2021	N/A	0	0	0
FY 2022	N/A	0	0	0
FY 2023	N/A	0	0	0
FY 2024	N/A	0	0	0
FY 2025	N/A	0	0	0
Total, OPC except D&D	**N/A**	**0**	**0**	**0**
Total Project Cost (TPC)				
FY 2005	N/A	0	0	0
FY 2006	N/A	0	0	0
FY 2007	N/A	0	0	0
FY 2008	N/A	0	0	0
FY 2009	N/A	0	0	0
FY 2010	N/A	0	0	0
FY 2011	N/A	0	0	0
FY 2012	N/A	0	0	0
FY 2013	N/A	0	0	0
FY 2014	N/A	0	0	0
FY 2015	N/A	0	0	0
FY 2016	N/A	0	0	0
FY 2017	N/A	55,000	55,000	50,000
FY 2018	N/A	120,000	120,000	115,000
FY 2019	N/A	109,000	109,000	70,000
FY 2020	N/A	0	0	45,000
FY 2021	N/A	0	0	4,000
FY 2022	N/A	0	0	0
FY 2023	N/A	0	0	0
FY 2024	N/A	0	0	0
FY 2025	N/A	0	0	0
Total, TPC	**N/A**	**284,000**	**284,000**	**284,000**

Substation Subproject (06-D-141-07)

	(dollars in thousands)			
	Appropriations	**Plan**	**Obligations**	**Costs**
Total Estimated Cost (TEC)				
Design				
FY 2005	N/A	0	0	0
FY 2006	N/A	0	0	0
FY 2007	N/A	0	0	0
FY 2008	N/A	0	0	0
FY 2009	N/A	0	0	0
FY 2010	N/A	0	0	0
FY 2011	N/A	0	0	0
FY 2012	N/A	0	0	0
FY 2013	N/A	0	0	0
FY 2014	N/A	0	0	0
FY 2015	N/A	0	0	0
FY 2016	N/A	0	0	0
FY 2017	N/A	0	0	0
FY 2018	N/A	0	0	0
FY 2019	N/A	0	0	0
FY 2020	N/A	0	0	0
FY 2021	N/A	0	0	0
FY 2022	N/A	0	0	0
FY 2023	N/A	0	0	0
FY 2024	N/A	0	0	0
FY 2025	N/A	0	0	0
Total, Design	**N/A**	**0**	**0**	**0**
Construction				
FY 2005	N/A	0	0	0
FY 2006	N/A	0	0	0
FY 2007	N/A	0	0	0
FY 2008	N/A	0	0	0
FY 2009	N/A	0	0	0
FY 2010	N/A	0	0	0
FY 2011	N/A	0	0	0
FY 2012	N/A	0	0	0
FY 2013	N/A	0	0	0
FY 2014	N/A	0	0	0
FY 2015	N/A	0	0	0
FY 2016	N/A	60,000	43,000	0
FY 2017	N/A	0	17,000	22,000
FY 2018	N/A	0	0	35,000
FY 2019	N/A	0	0	3,000
FY 2020	N/A	0	0	0

(dollars in thousands)

	Appropriations	Plan	Obligations	Costs
FY 2021	N/A	0	0	0
FY 2022	N/A	0	0	0
FY 2023	N/A	0	0	0
FY 2024	N/A	0	0	0
FY 2025	N/A	0	0	0
Total, Construction	**N/A**	**60,000**	**60,000**	**60,000**
TEC				
FY 2005	N/A	0	0	0
FY 2006	N/A	0	0	0
FY 2007	N/A	0	0	0
FY 2008	N/A	0	0	0
FY 2009	N/A	0	0	0
FY 2010	N/A	0	0	0
FY 2011	N/A	0	0	0
FY 2012	N/A	0	0	0
FY 2013	N/A	0	0	0
FY 2014	N/A	0	0	0
FY 2015	N/A	0	0	0
FY 2016	N/A	60,000	43,000	0
FY 2017	N/A	0	17,000	22,000
FY 2018	N/A	0	0	35,000
FY 2019	N/A	0	0	3,000
FY 2020	N/A	0	0	0
FY 2021	N/A	0	0	0
FY 2022	N/A	0	0	0
FY 2023	N/A	0	0	0
FY 2024	N/A	0	0	0
FY 2025	N/A	0	0	0
Total, TEC	**N/A**	**60,000**	**60,000**	**60,000**
Other Project Cost (OPC)				
OPC except D&D				
FY 2005	N/A	0	0	0
FY 2006	N/A	0	0	0
FY 2007	N/A	0	0	0
FY 2008	N/A	0	0	0
FY 2009	N/A	0	0	0
FY 2010	N/A	0	0	0
FY 2011	N/A	0	0	0
FY 2012	N/A	0	0	0
FY 2013	N/A	0	0	0
FY 2014	N/A	0	0	0
FY 2015	N/A	0	0	0

	(dollars in thousands)			
	Appropriations	**Plan**	**Obligations**	**Costs**
FY 2016	N/A	0	0	0
FY 2017	N/A	0	0	0
FY 2018	N/A	0	0	0
FY 2019	N/A	0	0	0
FY 2020	N/A	0	0	0
FY 2021	N/A	0	0	0
FY 2022	N/A	0	0	0
FY 2023	N/A	0	0	0
FY 2024	N/A	0	0	0
FY 2025	N/A	0	0	0
Total, OPC except D&D	**N/A**	**0**	**0**	**0**
Total Project Cost (TPC)				
FY 2005	N/A	0	0	0
FY 2006	N/A	0	0	0
FY 2007	N/A	0	0	0
FY 2008	N/A	0	0	0
FY 2009	N/A	0	0	0
FY 2010	N/A	0	0	0
FY 2011	N/A	0	0	0
FY 2012	N/A	0	0	0
FY 2013	N/A	0	0	0
FY 2014	N/A	0	0	0
FY 2015	N/A	0	0	0
FY 2016	N/A	60,000	43,000	0
FY 2017	N/A	0	17,000	22,000
FY 2018	N/A	0	0	35,000
FY 2019	N/A	0	0	3,000
FY 2020	N/A	0	0	0
FY 2021	N/A	0	0	0
FY 2022	N/A	0	0	0
FY 2023	N/A	0	0	0
FY 2024	N/A	0	0	0
FY 2025	N/A	0	0	0
Total, TPC	**N/A**	**60,000**	**60,000**	**60,000**

Process Support Facilities Subproject (06-D-141-08)

(dollars in thousands)

	Appropriations	Plan	Obligations	Costs
Total Estimated Cost (TEC)				
Design				
FY 2005	N/A	0	0	0
FY 2006	N/A	0	0	0
FY 2007	N/A	0	0	0
FY 2008	N/A	0	0	0
FY 2009	N/A	0	0	0
FY 2010	N/A	0	0	0
FY 2011	N/A	0	0	0
FY 2012	N/A	0	0	0
FY 2013	N/A	0	0	0
FY 2014	N/A	0	0	0
FY 2015	N/A	0	0	0
FY 2016	N/A	0	0	0
FY 2017	N/A	0	0	0
FY 2018	N/A	0	0	0
FY 2019	N/A	0	0	0
FY 2020	N/A	0	0	0
FY 2021	N/A	0	0	0
FY 2022	N/A	0	0	0
FY 2023	N/A	0	0	0
FY 2024	N/A	0	0	0
FY 2025	N/A	0	0	0
Total, Design	**N/A**	**0**	**0**	**0**
Construction				
FY 2005	N/A	0	0	0
FY 2006	N/A	0	0	0
FY 2007	N/A	0	0	0
FY 2008	N/A	0	0	0
FY 2009	N/A	0	0	0
FY 2010	N/A	0	0	0
FY 2011	N/A	0	0	0
FY 2012	N/A	0	0	0
FY 2013	N/A	0	0	0
FY 2014	N/A	0	0	0
FY 2015	N/A	0	0	0
FY 2016	N/A	0	0	0
FY 2017	N/A	0	0	0
FY 2018	N/A	5,000	5,000	4,500
FY 2019	N/A	20,000	20,000	18,000
FY 2020	N/A	45,000	45,000	45,000

	(dollars in thousands)			
	Appropriations	**Plan**	**Obligations**	**Costs**
FY 2021	N/A	40,000	40,000	40,000
FY 2022	N/A	1,000	1,000	3,000
FY 2023	N/A	0	0	250
FY 2024	N/A	0	0	250
FY 2025	N/A	0	0	0
Total, Construction	**N/A**	**111,000**	**111,000**	**111,000**
TEC				
FY 2005	N/A	0	0	0
FY 2006	N/A	0	0	0
FY 2007	N/A	0	0	0
FY 2008	N/A	0	0	0
FY 2009	N/A	0	0	0
FY 2010	N/A	0	0	0
FY 2011	N/A	0	0	0
FY 2012	N/A	0	0	0
FY 2013	N/A	0	0	0
FY 2014	N/A	0	0	0
FY 2015	N/A	0	0	0
FY 2016	N/A	0	0	0
FY 2017	N/A	0	0	0
FY 2018	N/A	5,000	5,000	4,500
FY 2019	N/A	20,000	20,000	18,000
FY 2020	N/A	45,000	45,000	45,000
FY 2021	N/A	40,000	40,000	40,000
FY 2022	N/A	1,000	1,000	3,000
FY 2023	N/A	0	0	250
FY 2024	N/A	0	0	250
FY 2025	N/A	0	0	0
Total, TEC	**N/A**	**111,000**	**111,000**	**111,000**
Other Project Cost (OPC)				
OPC except D&D				
FY 2005	N/A	0	0	0
FY 2006	N/A	0	0	0
FY 2007	N/A	0	0	0
FY 2008	N/A	0	0	0
FY 2009	N/A	0	0	0
FY 2010	N/A	0	0	0
FY 2011	N/A	0	0	0
FY 2012	N/A	0	0	0
FY 2013	N/A	0	0	0
FY 2014	N/A	0	0	0
FY 2015	N/A	0	0	0
FY 2016	N/A	0	0	0
FY 2017	N/A	0	0	0

	(dollars in thousands)			
	Appropriations	**Plan**	**Obligations**	**Costs**
FY 2018	N/A	0	0	0
FY 2019	N/A	0	0	0
FY 2020	N/A	0	0	0
FY 2021	N/A	0	0	0
FY 2022	N/A	0	0	0
FY 2023	N/A	10,000	10,000	5,000
FY 2024	N/A	0	0	5,000
FY 2025	N/A	0	0	0
Total, OPC except D&D	**N/A**	**10,000**	**10,000**	**10,000**
Total Project Cost (TPC)				
FY 2005	N/A	0	0	0
FY 2006	N/A	0	0	0
FY 2007	N/A	0	0	0
FY 2008	N/A	0	0	0
FY 2009	N/A	0	0	0
FY 2010	N/A	0	0	0
FY 2011	N/A	0	0	0
FY 2012	N/A	0	0	0
FY 2013	N/A	0	0	0
FY 2014	N/A	0	0	0
FY 2015	N/A	0	0	0
FY 2016	N/A	0	0	0
FY 2017	N/A	0	0	0
FY 2018	N/A	5,000	5,000	4,500
FY 2019	N/A	20,000	20,000	18,000
FY 2020	N/A	45,000	45,000	45,000
FY 2021	N/A	40,000	40,000	40,000
FY 2022	N/A	1,000	1,000	3,000
FY 2023	N/A	10,000	10,000	5,250
FY 2024	N/A	0	0	5,250
FY 2025	N/A	0	0	0
Total, TPC	**N/A**	**121,000**	**121,000**	**121,000**

Salvage and Accountability Building Subproject (06-D-141-09)

(dollars in thousands)

	Appropriations	Plan	Obligations	Costs
Total Estimated Cost (TEC)				
Design				
FY 2005	N/A	0	0	0
FY 2006	N/A	0	0	0
FY 2007	N/A	0	0	0
FY 2008	N/A	0	0	0
FY 2009	N/A	0	0	0
FY 2010	N/A	0	0	0
FY 2011	N/A	0	0	0
FY 2012	N/A	0	0	0
FY 2013	N/A	0	0	0
FY 2014	N/A	0	0	0
FY 2015	N/A	0	0	0
FY 2016	N/A	0	0	0
FY 2017	N/A	0	0	0
FY 2018	N/A	0	0	0
FY 2019	N/A	0	0	0
FY 2020	N/A	0	0	0
FY 2021	N/A	0	0	0
FY 2022	N/A	0	0	0
FY 2023	N/A	0	0	0
FY 2024	N/A	0	0	0
FY 2025	N/A	0	0	0
Total, Design	**N/A**	**0**	**0**	**0**
Construction				
FY 2005	N/A	0	0	0
FY 2006	N/A	0	0	0
FY 2007	N/A	0	0	0
FY 2008	N/A	0	0	0
FY 2009	N/A	0	0	0
FY 2010	N/A	0	0	0
FY 2011	N/A	0	0	0
FY 2012	N/A	0	0	0
FY 2013	N/A	0	0	0
FY 2014	N/A	0	0	0
FY 2015	N/A	0	0	0
FY 2016	N/A	0	0	0
FY 2017	N/A	0	0	0
FY 2018	N/A	200,000	200,000	150,000
FY 2019	N/A	153,000	153,000	200,000
FY 2020	N/A	250,000	250,000	250,000
FY 2021	N/A	247,000	247,000	250,000
FY 2022	N/A	150,000	150,000	150,000

(dollars in thousands)

	Appropriations	Plan	Obligations	Costs
FY 2023	N/A	60,250	60,250	50,000
FY 2024	N/A	0	0	10,250
FY 2025	N/A	0	0	0
Total, Construction	**N/A**	**1,060,250**	**1,060,250**	**1,060,250**
TEC				
FY 2005	N/A	0	0	0
FY 2006	N/A	0	0	0
FY 2007	N/A	0	0	0
FY 2008	N/A	0	0	0
FY 2009	N/A	0	0	0
FY 2010	N/A	0	0	0
FY 2011	N/A	0	0	0
FY 2012	N/A	0	0	0
FY 2013	N/A	0	0	0
FY 2014	N/A	0	0	0
FY 2015	N/A	0	0	0
FY 2016	N/A	0	0	0
FY 2017	N/A	0	0	0
FY 2018	N/A	200,000	200,000	150,000
FY 2019	N/A	153,000	153,000	200,000
FY 2020	N/A	250,000	250,000	250,000
FY 2021	N/A	247,000	247,000	250,000
FY 2022	N/A	150,000	150,000	150,000
FY 2023	N/A	60,250	60,250	50,000
FY 2024	N/A	0	0	10,250
FY 2025	N/A	0	0	0
Total, TEC	**N/A**	**1,060,250**	**1,060,250**	**1,060,250**
Other Project Cost (OPC)				
OPC except D&D				
FY 2005	N/A	0	0	0
FY 2006	N/A	0	0	0
FY 2007	N/A	0	0	0
FY 2008	N/A	0	0	0
FY 2009	N/A	0	0	0
FY 2010	N/A	0	0	0
FY 2011	N/A	0	0	0
FY 2012	N/A	0	0	0
FY 2013	N/A	0	0	0
FY 2014	N/A	0	0	0
FY 2015	N/A	0	0	0
FY 2016	N/A	0	0	0
FY 2017	N/A	0	0	0

	(dollars in thousands)			
	Appropriations	**Plan**	**Obligations**	**Costs**
FY 2018	N/A	0	0	0
FY 2019	N/A	0	0	0
FY 2020	N/A	0	0	0
FY 2021	N/A	0	0	0
FY 2022	N/A	5,000	5,000	1,000
FY 2023	N/A	10,000	10,000	10,500
FY 2024	N/A	10,000	10,000	13,000
FY 2025	N/A	0	0	500
Total, OPC except D&D	**N/A**	**25,000**	**25,000**	**25,000**
Total Project Cost (TPC)				
FY 2005	N/A	0	0	0
FY 2006	N/A	0	0	0
FY 2007	N/A	0	0	0
FY 2008	N/A	0	0	0
FY 2009	N/A	0	0	0
FY 2010	N/A	0	0	0
FY 2011	N/A	0	0	0
FY 2012	N/A	0	0	0
FY 2013	N/A	0	0	0
FY 2014	N/A	0	0	0
FY 2015	N/A	0	0	0
FY 2016	N/A	0	0	0
FY 2017	N/A	0	0	0
FY 2018	N/A	200,000	200,000	150,000
FY 2019	N/A	153,000	153,000	200,000
FY 2020	N/A	250,000	250,000	250,000
FY 2021	N/A	247,000	247,000	250,000
FY 2022	N/A	155,000	155,000	151,000
FY 2023	N/A	70,250	70,250	60,500
FY 2024	N/A	10,000	10,000	23,250
FY 2025	N/A	0	0	500
Total, TPC	**N/A**	**1,085,250**	**1,085,250**	**1,085,250**

Overall Project (06-D-141)

(dollars in thousands)

	Appropriations	Plan	Obligations	Costs
Total Estimated Cost (TEC)				
Design				
FY 2005	N/A	0	0	0
FY 2006	5,000	5,000	5,000	0
FY 2007	5,000	5,000	5,000	677
FY 2008	38,583	38,583	38,583	33,950
FY 2009	90,622	90,622	90,622	79,184
FY 2010	94,000	94,000	94,000	80,959
FY 2011	114,786	114,786	114,786	109,855
FY 2012	N/A	160,194	160,109	170,700
FY 2013	N/A	269,506	269,463	192,389
FY 2014	N/A	304,000	300,000	198,448
FY 2015	N/A	257,000	240,000	256,866
FY 2016	N/A	298,000	285,596	274,536
FY 2017	N/A	289,309	322,841	355,640
FY 2018	N/A	0	0	172,796
FY 2019	N/A	0	0	0
FY 2020	N/A	0	0	0
FY 2021	N/A	0	0	0
FY 2022	N/A	0	0	0
FY 2023	N/A	0	0	0
FY 2024	N/A	0	0	0
FY 2025	N/A	0	0	0
Total, Design	**N/A**	**1,926,000**	**1,926,000**	**1,926,000**
Construction				
FY 2005	N/A	0	0	0
FY 2006	N/A	0	0	0
FY 2007	N/A	0	0	0
FY 2008	N/A	0	0	0
FY 2009	N/A	0	0	0
FY 2010	N/A	0	0	0
FY 2011	N/A	0	0	0
FY 2012	N/A	0	0	0
FY 2013	N/A	43,277	43,277	5,242
FY 2014	N/A	0	0	25,928
FY 2015	N/A	78,000	78,000	20,853
FY 2016	N/A	132,000	115,000	31,833
FY 2017	N/A	285,191	302,191	244,379
FY 2018	N/A	662,000	662,000	634,500
FY 2019	N/A	720,000	720,000	791,000
FY 2020	N/A	725,000	725,000	840,000
FY 2021	N/A	730,000	730,000	769,000
FY 2022	N/A	580,000	580,000	548,000

	(dollars in thousands)			
	Appropriations	**Plan**	**Obligations**	**Costs**
FY 2023	N/A	178,250	178,250	210,250
FY 2024	N/A	14,782	14,782	25,500
FY 2025	N/A	0	0	2,015
Total, Construction	**N/A**	**4,148,500**	**4,148,500**	**4,148,500**
TEC				
FY 2005	N/A	0	0	0
FY 2006	N/A	5,000	5,000	0
FY 2007	N/A	5,000	5,000	677
FY 2008	N/A	38,583	38,583	33,950
FY 2009	N/A	90,622	90,622	79,184
FY 2010	N/A	94,000	94,000	80,959
FY 2011	N/A	114,786	114,786	109,855
FY 2012	N/A	160,194	160,109	170,700
FY 2013	N/A	312,783	312,740	197,631
FY 2014	N/A	304,000	300,000	224,376
FY 2015	N/A	335,000	318,000	277,719
FY 2016	N/A	430,000	400,596	306,369
FY 2017	N/A	574,500	625,032	600,019
FY 2018	N/A	662,000	662,000	807,296
FY 2019	N/A	720,000	720,000	791,000
FY 2020	N/A	725,000	725,000	840,000
FY 2021	N/A	730,000	730,000	769,000
FY 2022	N/A	580,000	580,000	548,000
FY 2023	N/A	178,250	178,250	210,250
FY 2024	N/A	14,782	14,782	25,500
FY 2025	N/A	0	0	2,015
Total, TEC	**N/A**	**6,074,500**	**6,074,500**	**6,074,500**
Other Project Cost (OPC)				
OPC except D&D				
FY 2005	12,113	12,113	12,113	12,113
FY 2006	7,809	7,809	7,809	7,809
FY 2007	10,082	10,082	10,082	10,082
FY 2008	11,730	11,730	11,730	11,730
FY 2009	14,000	14,000	14,000	14,000
FY 2010	20,500	20,500	20,500	20,500
FY 2011	18,894	18,894	18,894	18,894
FY 2012	N/A	0	0	0
FY 2013	N/A	0	0	0
FY 2014	N/A	0	0	0
FY 2015	N/A	0	0	0
FY 2016	N/A	0	0	0
FY 2017	N/A	500	500	500

(dollars in thousands)

	Appropriations	Plan	Obligations	Costs
FY 2018	N/A	1,000	1,000	500
FY 2019	N/A	2,000	2,000	1,500
FY 2020	N/A	10,000	10,000	6,000
FY 2021	N/A	10,000	10,000	15,000
FY 2022	N/A	50,000	50,000	31,000
FY 2023	N/A	206,750	125,000	105,500
FY 2024	N/A	50,122	110,000	118,000
FY 2025	N/A	0	21,872	52,372
Total, OPC except D&D	**N/A**	**425,500**	**425,500**	**425,500**
Total Project Cost (TPC)				
FY 2005	12,113	12,113	12,113	12,113
FY 2006	12,809	12,809	12,809	7,809
FY 2007	15,082	15,082	15,082	10,759
FY 2008	50,313	50,313	50,313	45,680
FY 2009	104,622	104,622	104,622	93,184
FY 2010	114,500	114,500	114,500	101,459
FY 2011	133,680	133,680	133,680	128,749
FY 2012	160,194	160,194	160,109	170,700
FY 2013	312,783	312,783	312,740	197,631
FY 2014	304,000	304,000	300,000	224,376
FY 2015	335,000	335,000	318,000	277,719
FY 2016	430,000	430,000	400,596	306,369
FY 2017	575,000	575,000	625,532	600,519
FY 2018	663,000	663,000	663,000	807,796
FY 2019	722,000	722,000	722,000	792,500
FY 2020	735,000	735,000	735,000	846,000
FY 2021	740,000	740,000	740,000	784,000
FY 2022	630,000	630,000	630,000	579,000
FY 2023	385,000	385,000	303,250	315,750
FY 2024	64,904	64,904	124,782	143,500
FY 2025	0	0	21,872	54,387
Total, TPC	**6,500,000**	**6,500,000**	**6,500,000**	**6,500,000**

6. Details of Project Cost Estimate

Site Readiness Subproject (06-D-141-01)

(dollars in thousands)

	Current Total Estimate	Previous Total Estimate	Original Validated Baseline
Total Estimated Cost (TEC)			
Design			
Design	0	0	N/A
Contingency	0	0	N/A
Total, Design	**0**	**0**	**N/A**
Construction			
Site Preparation	43,277	43,277	50,200
Equipment	0	0	0
Other Construction	0	0	0
Contingency	0	0	13,800
Total, Construction	**43,277**	**43,277**	**64,000**
Total, TEC	**43,277**	**43,277**	**64,000**
Contingency, TEC	**0**	**0**	**13,800**
Other Project Cost (OPC)			
OPC except D&D			
Conceptual Planning	0	0	0
Conceptual Design	0	0	0
Start-up	0	0	1,000
Contingency	0	0	0
Total, OPC except D&D	**0**	**0**	**1,000**
D&D			
D&D	0	0	0
Contingency	0	0	0
Total, D&D	**0**	**0**	**0**
Total, OPC	**0**	**0**	**1,000**
Contingency, OPC	**0**	**0**	**0**
Total, TPC	**43,277**	**43,277**	**65,000**
Total, Contingency	**0**	**0**	**13,800**

Main Process Building Subproject (06-D-141-04)

	(dollars in thousands)		
	Current Total Estimate	**Previous Total Estimate**	**Original Validated Baseline**
Total Estimated Cost (TEC)			
Design			
Design	1,776,000	1,680,000	N/A
Contingency	150,000	200,000	N/A
Total, Design	**1,926,000**	**1,880,000**	**N/A**
Construction			
Site Preparation	80,000	150,000	N/A
Equipment	350,000	300,000	N/A
Other Construction	1,538,373	1,025,723	N/A
Contingency	543,600	663,000	N/A
Total, Construction	**2,511,973**	**2,138,723**	**N/A**
Total, TEC	**4,437,973**	**4,018,723**	**N/A**
Contingency, TEC	**693,600**	**863,000**	**N/A**
Other Project Cost (OPC)			
OPC except D&D			
Conceptual Planning	30,000	30,000	N/A
Conceptual Design	64,500	64,500	N/A
Start-up	275,500	200,000	N/A
Contingency	20,000	25,000	N/A
Total, OPC except D&D	**390,000**	**319,500**	**N/A**
D&D			
D&D	0	0	N/A
Contingency	0	0	N/A
Total, D&D	**0**	**0**	**N/A**
Total, OPC	**390,000**	**319,500**	**N/A**
Contingency, OPC	**20,000**	**25,000**	**N/A**
Total, TPC	**4,827,973**	**4,338,223**	**N/A**
Total, Contingency	**713,600**	**888,000**	**N/A**

Site Infrastructure and Services Subproject (06-D-141-05)

(dollars in thousands)

	Current Total Estimate	Previous Total Estimate	Original Validated Baseline
Total Estimated Cost (TEC)			
Design			
Design	0	0	N/A
Contingency	0	0	N/A
Total, Design	**0**	**0**	**N/A**
Construction			
Site Preparation	28,000	28,000	26,000
Equipment	0	0	0
Other Construction	32,000	25,000	30,000
Contingency	18,000	25,000	22,500
Total, Construction	**78,000**	**78,000**	**78,500**
Total, TEC	**78,000**	**78,000**	**78,500**
Contingency, TEC	**18,000**	**25,000**	**22,500**
Other Project Cost (OPC)			
OPC except D&D			
Conceptual Planning	0	0	0
Conceptual Design	0	0	0
Start-up	500	500	0
Contingency	0	0	0
Total, OPC except D&D	**500**	**500**	**0**
D&D			
D&D	0	0	0
Contingency	0	0	0
Total, D&D	**0**	**0**	**0**
Total, OPC	**500**	**500**	**0**
Contingency, OPC	0	0	0
Total, TPC	**78,500**	**78,500**	**78,500**
Total, Contingency	**18,000**	**25,000**	**22,500**

Mechanical Electrical Building (MEB) Subproject (06-D-141-06)

(dollars in thousands)

	Current Total Estimate	Previous Total Estimate	Original Validated Baseline
Total Estimated Cost (TEC)			
Design			
Design	0	0	0
Contingency	0	0	0
Total, Design	**0**	**0**	**0**
Construction			
Site Preparation	0	0	0
Equipment	20,000	75,000	20,000
Other Construction	184,000	315,000	184,000
Contingency	80,000	150,000	80,000
Total, Construction	**284,000**	**540,000**	**284,000**
Total, TEC	**284,000**	**540,000**	**284,000**
Contingency, TEC	**80,000**	**150,000**	**80,000**
Other Project Cost (OPC)			
OPC except D&D			
Conceptual Planning	0	0	0
Conceptual Design	0	0	0
Start-up	0	54,000	0
Contingency	0	6,000	0
Total, OPC except D&D	**0**	**60,000**	**0**
D&D			
D&D	0	0	0
Contingency	0	0	0
Total, D&D	**0**	**0**	**0**
Total, OPC	**0**	**60,000**	**0**
Contingency, OPC	**0**	**6,000**	**0**
Total, TPC	**284,000**	**600,000**	**284,000**
Total, Contingency	**80,000**	**156,000**	**80,000**

Substation Subproject (06-D-141-07)

(dollars in thousands)

	Current Total Estimate	Previous Total Estimate	Original Validated Baseline
Total Estimated Cost (TEC)			
Design			
Design	0	0	0
Contingency	0	0	0
Total, Design	**0**	**0**	**0**
Construction			
Site Preparation	3,000	3,000	3,000
Equipment	47,000	30,000	47,000
Other Construction	0	0	0
Contingency	10,000	15,000	10,000
Total, Construction	**60,000**	**48,000**	**60,000**
Total, TEC	**60,000**	**48,000**	**60,000**
Contingency, TEC	**10,000**	**15,000**	**10,000**
Other Project Cost (OPC)			
OPC except D&D			
Conceptual Planning	0	0	0
Conceptual Design	0	0	0
Start-up	0	2,000	0
Contingency	0	0	0
Total, OPC except D&D	**0**	**2,000**	**0**
D&D			
D&D	0	0	0
Contingency	0	0	0
Total, D&D	**0**	**0**	**0**
Total, OPC	**0**	**2,000**	**0**
Contingency, OPC	**0**	**0**	**0**
Total, TPC	**60,000**	**50,000**	**60,000**
Total, Contingency	**10,000**	**15,000**	**10,000**

Process Support Facilities Subproject (06-D-141-08)

(dollars in thousands)

	Current Total Estimate	Previous Total Estimate	Original Validated Baseline
Total Estimated Cost (TEC)			
Design			
Design	0	0	N/A
Contingency	0	0	N/A
Total, Design	**0**	**0**	**N/A**
Construction			
Site Preparation	0	0	N/A
Equipment	11,000	5,000	N/A
Other Construction	80,000	40,000	N/A
Contingency	20,000	10,000	N/A
Total, Construction	**111,000**	**55,000**	**N/A**
Total, TEC	**111,000**	**55,000**	**N/A**
Contingency, TEC	**20,000**	**10,000**	**N/A**
Other Project Cost (OPC)			
OPC except D&D			
Conceptual Planning	0	0	N/A
Conceptual Design	0	0	N/A
Start-up	9,500	4,000	N/A
Contingency	500	1,000	N/A
Total, OPC except D&D	**10,000**	**5,000**	**N/A**
D&D			
D&D	0	0	N/A
Contingency	0	0	N/A
Total, D&D	**0**	**0**	**N/A**
Total, OPC	**10,000**	**5,000**	**N/A**
Contingency, OPC	**500**	**1,000**	**N/A**
Total, TPC	**121,000**	**60,000**	**N/A**
Total, Contingency	**20,500**	**11,000**	**N/A**

(dollars in thousands)

Salvage and Accountability Building Subproject (06-D-141-09)	Current Total Estimate	Previous Total Estimate	Original Validated Baseline
Total Estimated Cost (TEC)			
Design			
Design	0	0	N/A
Contingency	0	0	N/A
Total, Design	**0**	**0**	**N/A**
Construction			
Site Preparation	0	0	N/A
Equipment	240,000	225,000	N/A
Other Construction	670,250	690,000	N/A
Contingency	150,000	285,000	N/A
Total, Construction	**1,060,250**	**1,200,000**	**N/A**
Total, TEC	**1,060,250**	**1,200,000**	**N/A**
Contingency, TEC	**150,000**	**285,000**	**N/A**
Other Project Cost (OPC)			
OPC except D&D			
Conceptual Planning	0	0	N/A
Conceptual Design	0	0	N/A
Start-up	20,000	110,000	N/A
Contingency	5,000	20,000	N/A
Total, OPC except D&D	**25,000**	**130,000**	**N/A**
D&D			
D&D	0	0	N/A
Contingency	0	0	N/A
Total, D&D	**0**	**0**	**N/A**
Total, OPC	**25,000**	**130,000**	**N/A**
Contingency, OPC	5,000	20,000	N/A
Total, TPC	**1,085,250**	**1,330,000**	**N/A**
Total, Contingency	**155,000**	**305,000**	**N/A**

Overall Project (06-D-141)

	(dollars in thousands)		
	Current Total Estimate	**Previous Total Estimate**	**Original Validated Baseline**
Total Estimated Cost (TEC)			
Design			
Design	1,776,000	1,680,000	N/A
Contingency	150,000	200,000	N/A
Total, Design	**1,926,000**	**1,880,000**	**N/A**
Construction			
Site Preparation	154,277	224,277	N/A
Equipment	668,000	635,000	N/A
Other Construction	2,504,623	2,095,723	N/A
Contingency	821,600	1,148,000	N/A
Total, Construction	**4,148,500**	**4,103,000**	**N/A**
Total, TEC	**6,074,500**	**5,983,000**	**N/A**
Contingency, TEC	**971,600**	**1,348,000**	**N/A**
Other Project Cost (OPC)			
OPC except D&D			
Conceptual Planning	30,000	30,000	N/A
Conceptual Design	64,500	64,500	N/A
Start-up	305,500	370,500	N/A
Contingency	25,500	52,000	N/A
Total, OPC except D&D	**425,500**	**517,000**	**N/A**
D&D			
D&D	0	0	N/A
Contingency	0	0	N/A
Total, D&D	**0**	**0**	**N/A**
Total, OPC	**425,500**	**517,000**	**N/A**
Contingency, OPC	**25,500**	**52,000**	**N/A**
Total, TPC	**6,500,000**	**6,500,000**	**N/A**
Total, Contingency	**997,100**	**1,400,000**	**N/A**

Related Operations and Maintenance Funding Requirements

Start of Operation or Beneficial Occupancy	Calendar Year 2025
Expected Useful Life (number of years)	50 Years
Expected Future Start of D&D of this capital asset	N/A

D&D Information

The new area being constructed in this project is replacing existing facilities; however, the costs of D&D of the facilities that are being replaced are not included in the costs of this construction project. D&D of existing facilities will be the responsibility of the DOE Office of Environmental Management.

The construction of the UPF Project will add approximately 160,000 base-level square feet of new buildings to the Y-12 footprint and will allow eventual replacement of functions in Building 9212 including EU casting and EU chemical processing operations. The final D&D and demolition of these areas are not considered part of the UPF project. Building 9107 (11,000 square feet) was demolished as part of the SIS Subproject to facilitate clearing the UPF construction site.

Acquisition Approach

The NNSA Federal Project Director and the Integrated Project Team will be responsible for the execution of the project. The Management and Operating (M&O) partners for Y-12 are the designated design authority. The Office of Defense Programs (NA-10) and the Uranium Program Manager are responsible for defining program requirements, selecting the preferred alternatives, and for any project scope changes. The Office of Acquisition and Project Management (NA-APM) is responsible for providing support for alternative studies, and the lead NNSA office during design and construction of the project. The UPF Project is being executed through several acquisition strategies, to include firm fixed price, design bid build, design build and cost plus design build contracts.

The Department will administer Architect-Engineer and Construction Contracts utilizing the M&O and stand-alone contract vehicles. Additionally, the United States Army Corps of Engineers (USACE) will have acquisition and project management responsibility for appropriate scopes of work as determined by the Department.

Construction scope for the Site Infrastructure and Services Subproject, Mechanical Electrical Building Subproject, Substation Subproject and Site Preparation is being performed under firm fixed price construction contracts or subcontracts when determined to be the best value for the government. The remaining subprojects are being assessed for best value acquisition strategies to include fixed price and cost plus subcontracts based on Federal Acquisition Regulation principles.

04-D-125, Chemistry and Metallurgy Research Building Replacement (CMRR) Project, Los Alamos National Laboratory (LANL), Los Alamos, New Mexico
Project is for Design and Construction

Significant Changes and Summary

Significant Changes
This Construction Project Data Sheet (CPDS) is an update to the FY 2017 President's Budget Request CPDS for CMRR and does not include a new start for the budget year. Two of the four active subprojects achieved design maturity and baseline approval on October 31, 2016, Radiological Laboratory Equipment Installation Phase 2 (REI2) and Plutonium Facility Equipment Installation Phase 1 (PEI1). The remaining active subprojects, PF-4 Equipment Installation Phase 2 (PEI2) and Re-categorizing RLUOB to Hazard Category 3 (RC3), have not completed design/baseline development; their estimates will be refined in subsequent budget submissions. Overall total project cost for CMRR remains unchanged for this submission.

As with the FY 2017 CPDS, this FY 2018 CPDS utilizes the restructuring (or phasing per DOE O413.3B) of the CMRR project scope as (4) four active subprojects, which are necessary to provide continuity in analytical chemistry (AC) and materials characterization (MC) capabilities and support the cessation of programmatic operations in the existing CMR facility. This restructuring was approved by the Deputy Secretary of Energy on November 25, 2015.

Execution of the CMRR Project under the cost and schedule parameters established at CD-1 is principally dependent on predictable, stable appropriations at the CMRR project (04-D-125) level. Without the ability to move funds between subprojects, the completion dates for the PEI2 and RC3 subprojects will challenge the programmatic need dates associated with the LANL mission. This risk can be reduced by allocating funds at the CMRR project level beginning in FY 2018, allowing any efficiencies realized on the REI2 and PEI1 subprojects to be used to advance the PEI2 and RC3 subprojects.

This CPDS reflects:
- The project structure approved on November 25, 2015.
- An FY 2018 funding request intended to preserve the project baselines established for the REI2 and PEI1 subprojects.
- A forecast change to the planned critical milestones (Section 2 of PDS) for the PEI2 and RC3 subprojects of approximately two years.

Summary
The Critical Decision -1 (CD-1), Approve Alternative Selection and Cost Range for the CMRR project was approved on August 21, 2014 with a cost range of $2.4 billion - $2.9 billion and CD-4 in FY 2024. The CMRR Restructuring has not impacted the Revised CD-1 cost estimate from August 2014.

Under the CMRR restructuring, the subprojects are described below:

RLUOB Subproject (04-D-125-01): CD-4 approved on June 24, 2010.
RLUOB Equipment Installation (REI) Subproject (04-D-125-02): CD-4 approved on June 20, 2013.
Nuclear Facility (NF) Subproject (04-D-125-03): This subproject is cancelled.

REI Phase 2 (REI2) Subproject (04-D-125-04): Transfers part of AC and MC capabilities from CMR to RLUOB by designing, purchasing and installing additional equipment in RLUOB. A CD-3A request for procurement of long lead equipment and site preparations, following a reconciled Independent Cost Estimate (ICE) conducted by DOE-APM, was approved for REI2 on December 18, 2014. CD-3B for additional long lead procurements for REI2 was approved on December 22, 2015. REI2 CD-2/3 approval was received on October 31, 2016 with the Performance baseline established at $633.25M. CD-4 completion is scheduled for January 5, 2022.

PF-4 Equipment Installation Phase 1 (PEI1) Subproject (04-D-125-05): Maximizes use of PF-4 by decommissioning and decontaminating (D&D) old gloveboxes and equipment, reconfiguring and reusing existing gloveboxes, consolidating and relocating existing capabilities, and installing new gloveboxes and equipment for AC/MC capabilities. PEI1 will establish the AC and MC capabilities that utilize larger amount of nuclear materials. CD-3A for PEI1 was approved on March 18, 2015.

CD-3B for long lead procurements was approved on December 22, 2015. PEI1 CD-2/3 approval was received on October 31, 2016 with the Performance Baseline established at $394M. CD-4 completion is scheduled for April 30, 2022.

PF-4 Equipment Installation Phase 2 (PEI2) Subproject (04-D-125-06): Maximize use of PF-4 by consolidating and relocating existing capabilities, replacing existing equipment, installing gloveboxes and equipment and D&D of existing laboratory space for AC/MC capabilities. PEI2 will establish enduring AC and MC capabilities for supporting NNSA actinide-based missions. The preliminary cost range for the work in this subproject is $523M - $675.2M.

Re-categorizing RLUOB to Hazard Category 3 (RC3) Subproject (04-D-125-07): Maximizes use of RLUOB by reconfiguring existing laboratory space and equipping the remaining empty laboratories with AC and MC capabilities, and enables the RLUOB to be re-categorized from a radiological facility to a hazard category-3 facility with a material limit of 400 grams of Pu-239 equivalent. RC3 will establish enduring AC and MC capabilities for supporting NNSA actinide-based missions. The preliminary cost range for the work in this subproject is $208M - $337.53M.

Consistent with DOE O 413.3B, any TPC savings from CMRR subprojects will be returned to the contingency pool for other CMRR subprojects.

A Federal Project Director at the appropriate level will be assigned to each sub-project.

Critical Milestone History

(fiscal quarter or date)

	CD-0	Conceptual Design Complete	CD-1	CD-2	Final Design Complete	CD-3	D&D Complete	CD-4
FY 2004	07/16/2002	N/A	1QFY2004		N/A	2QFY2004	N/A	1QFY2011
FY 2005	07/16/2002	N/A	3QFY2004		N/A	3QFY2005	N/A	3QFY2012
FY 2006	07/16/2002	N/A	2QFY2005	4QFY2005	N/A	1QFY2006	N/A	4QFY2010
FY 2007	07/16/2002	N/A	09/30/2005	1QFY2006	N/A	1QFY2006	N/A	1QFY2013
FY 2008	07/16/2002	N/A	09/30/2005	10/21/2005	N/A	1QFY2006	N/A	1QFY2013
FY 2009	07/16/2002	N/A	09/30/2005	TBD	N/A	TBD	N/A	TBD
FY 2010	07/16/2002	N/A	09/30/2005	TBD	N/A	TBD	N/A	TBD
FY 2011	07/16/2002	N/A	05/18/2005	TBD	N/A	TBD	N/A	TBD
FY 2012	07/16/2002	N/A	05/18/2005	4QFY2012	N/A	4QFY2012	N/A	TBD
FY 2012 Rep	07/16/2002	N/A	05/18/2005	TBD	TBD	TBD	N/A	TBD
FY 2016	07/16/2002	N/A	4QFY2014	3QFY2016	2QFY2016	3QFY2016	4QFY2019	4QFY2024
FY 2017	07/16/2002	N/A	08/21/14	3QFY2016	2QFY2016	3QFY2016	4QFY2019	4QFY2024
FY 2018	07/16/2002	N/A	08/21/14	2QFY2022	3QFY2021	2QFY2022	4QFY2026	4QFY2026

RLUOB Subproject (04-D-125-01)

(fiscal quarter or date)

	CD-0	Conceptual Design Complete	CD-1	CD-2	Final Design Complete	CD-3	D&D Complete	CD-4
FY 2011	07/16/2002	N/A	05/18/2005	10/21/2005	N/A	10/21/2005	N/A	02/28/2010
FY 2012	07/16/2002	N/A	05/18/2005	10/21/2005	N/A	10/21/2005	N/A	06/24/2010
FY 2012 Rep	07/16/2002	N/A	05/18/2005	10/21/2005	N/A	10/21/2005	N/A	06/24/2010
FY 2016	07/16/2002	N/A	05/18/2005	10/21/2005	N/A	10/21/2005	N/A	06/24/2010
FY 2017	07/16/2002	N/A	05/18/2005	10/21/2005	N/A	10/21/2005	N/A	06/24/2010
FY 2018	07/16/2002	N/A	05/18/2005	10/21/2005	N/A	10/21/2005	N/A	06/24/2010

RLUOB Equipment Installation (REI) Subproject (04-D-125-02)

(fiscal quarter or date)

	CD-0	Conceptual Design Complete	CD-1	CD-2	Final Design Complete	CD-3	D&D Complete	CD-4
FY 2011	07/16/2002	N/A	05/18/2005	07/17/2009	N/A	07/17/2009	N/A	04/30/2013
FY 2012	07/16/2002	N/A	05/18/2005	07/17/2009	N/A	07/17/2009	N/A	04/30/2013
FY 2012 Rep	07/16/2002	N/A	05/18/2005	07/17/2009	N/A	07/17/2009	N/A	3QFY2013
FY 2016	07/16/2002	N/A	05/18/2005	07/17/2009	N/A	07/17/2009	N/A	06/20/2013
FY 2017	07/16/2002	N/A	05/18/2005	07/17/2009	N/A	07/17/2009	N/A	06/20/2013
FY 2018	07/16/2002	N/A	05/18/2005	07/17/2009	N/A	07/17/2009	N/A	06/20/2013

Nuclear Facility (NF) Subproject (04-D-125-03)

(fiscal quarter or date)

	CD-0	Conceptual Design Complete	CD-1	CD-2	Final Design Complete	CD-3	D&D Complete	CD-4
FY 2011	07/16/2002	N/A	05/18/2005	TBD	N/A	TBD	N/A	TBD
FY 2012	07/16/2002	N/A	05/18/2005	4QFY2012	N/A	4QFY2012	N/A	TBD
FY 2012 Rep	07/16/2002	N/A	05/18/2005	TBD	TBD	TBD	N/A	TBD
FY 2016	07/16/2002	N/A	05/18/2005	Cancelled	Cancelled	Cancelled	N/A	Cancelled
FY 2017	07/16/2002	N/A	05/18/2005	Cancelled	Cancelled	Cancelled	N/A	Cancelled
FY 2018	07/16/2002	N/A	05/18/2005	Cancelled	Cancelled	Cancelled	N/A	Cancelled

REI Phase 2 (REI2) Subproject (04-D-125-04)

(fiscal quarter or date)

	CD-0	Conceptual Design Complete	CD-1	CD-2	Final Design Complete	CD-3	D&D Complete	CD-4
FY 2016	07/16/2002	8/21/2014	8/21/2014	3QFY2016	2QFY2016	3QFY2016	N/A	1QFY2020
FY 2017	07/16/2002	8/21/2014	8/21/2014	3QFY2016	2QFY2016	3QFY2016	N/A	1QFY2020
FY 2018	07/16/2002	8/21/2014	8/21/2014	10/31/2016	4/6/2016	10/31/2016	N/A	1/5/2022

	CD-3A	*CD-3B*
FY 2016	12/18/2014	2QFY2015
FY 2017	12/18/2014	12/22/2015
FY 2018	12/18/2014	12/22/2015

PF-4 Equipment Installation Phase 1 (PEI1) Subproject (04-D-125-05)

(fiscal quarter or date)

	CD-0	Conceptual Design Complete	CD-1	CD-2	Final Design Complete	CD-3	D&D Complete	CD-4
FY 2016	07/16/2002	4QFY2015	4QFY2014	3QFY2016	2QFY2016	3QFY2016	4QFY2019	1QFY2024
FY 2017	07/16/2002	8/21/2014	08/21/2014	3QFY2016	2QFY2016	3QFY2016	4QFY2019	1QFY2020
FY 2018	07/16/2002	8/21/2014	08/21/2014	10/31/2016	12/1/2016	10/31/2016	4QFY2019	4/30/2022

	CD-3A	*CD-3B*
FY 2017	03/18/2015	12/22/2015
FY 2018	03/18/2015	12/22/2015

PF-4 Equipment Installation Phase 2 (PEI2) Subproject (04-D-125-06)

(fiscal quarter or date)

	CD-0	Conceptual Design Complete	CD-1	CD-2	Final Design Complete	CD-3	D&D Complete	CD-4
FY 2016	07/16/2002	8/21/14	4QFY2014	3QFY2016	2QFY2016	3QFY2016	4QFY2019	1QFY2024
FY 2017	07/16/2002	8/21/14	08/21/2014	4QFY2017	3QFY2017	4QFY2017	4QFY2023	1QFY2024
FY 2018	07/16/2002	8/21/14	08/21/2014	4QFY2021	4QFY2020	4QFY2021	4QFY2026	4QFY2026 [a]

Re-categorizing RLUOB to Hazard Category 3 (RC3) Subproject (04-D-125-07)

(fiscal quarter or date)

	CD-0	Conceptual Design Complete	CD-1	CD-2	Final Design Complete	CD-3	D&D Complete	CD-4
FY 2016	07/16/2002	08/21/2014	4QFY2014	3QFY2018	2QFY2017	4QFY2017	N/A	1QFY2024
FY 2017	07/16/2002	08/21/2014	08/21/2014	3QFY2018	2QFY2017	3QFY2018	N/A	1QFY2024
FY 2018	07/16/2002	08/21/2014	08/21/2014	2QFY2022	3QFY2021	2QFY2022	N/A	4QFY2026[a]

CD-0 – Approve Mission Need
CD-1 – Approve Alternative Selection and Cost Range
CD-2 – Approve Performance Baseline
CD-3 – Approve Start of Construction
CD-4 – Approve Start of Operations or Project Closeout
D&D Start – Start of Demolition & Decontamination (D&D) work
D&D Complete – Completion of D&D work
CD-3A – Long Lead Procurement for equipment
CD-3B – Long Lead Procurement for equipment

[a] The indicated CD-4 dates for PEI2 and RC3 are preliminary estimates. At CD-2/3, the CD-4 dates for PEI2 and RC3 will be updated to reflect the approved performance baselines.

Project Cost History

(dollars in thousands)

	TEC Design 03-D-103	TEC Design/Construction 04-D-125	TEC, Total	OPC Except D&D	OPC, D&D	OPC Total	TPC
FY 2004	N/A	N/A	500,000	100,000	N/A	N/A	600,000
FY 2005	N/A	N/A	500,000	100,000	N/A	N/A	600,000
FY 2006	N/A	N/A	750,000	100,000	N/A	N/A	850,000
FY 2007	N/A	N/A	738,097	100,000	N/A	N/A	838,097
FY 2008	65,939	672,158	738,097	100,000	N/A	N/A	838,098
FY 2009	TBD	TBD	TBD	TBD	N/A	TBD	TBD
FY 2010	65,138	TBD	TBD	TBD	N/A	TBD	TBD
FY 2016	63,646	2,295,936	2,359,582	463,721	54,000	517,721	2,877,303
FY 2017	63,646	2,243,436	2,307,082	516,221	54,000	570,221	2,877,303
FY 2018	63,573	2,209,842	2,273,415	549,815	54,000	603,815	2,877,230

RLUOB Subproject (04-D-125-01) [a]

(dollars in thousands)

	TEC Design 03-D-103	TEC Design/Construction 04-D-125	TEC, Total	OPC Except D&D	OPC, D&D	OPC Total	TPC
FY 2011	N/A	159,130	159,130	4,870	N/A	4,870	164,000
FY 2012	N/A	159,130	159,130	4,870	N/A	4,870	164,000
FY 2012 Rep	N/A	159,130	159,130	4,870	N/A	4,870	164,000
FY 2016	N/A	194,130	194,130	4,870	N/A	4,870	199,000
FY 2017	N/A	194,130	194,130	4,870	N/A	4,870	199,000
FY 2018	N/A	194,130	194,130	4,870	N/A	4,870	199,000

RLUOB Equipment Installation (REI) Subproject (04-D-125-02) [a]

(dollars in thousands)

	TEC Design 03-D-103	TEC Design/Construction 04-D-125	TEC, Total	OPC Except D&D	OPC, D&D	OPC Total	TPC
FY 2011	N/A	152,900	152,900	46,500	N/A	46,500	199,400
FY 2012	N/A	152,900	152,900	46,500	N/A	46,500	199,400
FY 2012 Rep	N/A	152,900	152,900	46,500	N/A	46,500	199,400
FY 2016	N/A	151,963	151,963	44,797	N/A	44,797	196,760
FY 2017	N/A	151,963	151,963	44,797	N/A	44,797	196,760
FY 2018	N/A	151,963	151,963	44,797	N/A	44,797	196,760

[a] Beginning in the FY 2016 CPDS, the completed subproject (RLUOB) and cancelled subproject (NF) total costs have been adjusted to match final expenditures. Final costs adjusted to account for official contract closeout of all past CMRR design and construction contracts.

Nuclear Facility (NF) Subproject (04-D-125-03) [a]

(dollars in thousands)

	TEC Design 03-D-103	TEC Design/Construction 04-D-125	TEC, Total	OPC Except D&D	OPC, D&D	OPC Total	TPC
FY 2011	65,138	TBD	TBD	TBD	N/A	TBD	TBD
FY 2012	65,138	3,239,862 - 5,169,862	3,305,000 - 5,235,000	405,000 - 625,000	N/A	405,000- 625,000	3,710,000 - 5,860,000
FY 2012 Rep	65,138	TBD	TBD	4,870	N/A	TBD	TBD
FY 2016	63,646	391,324	454,970	40,274	N/A	40,274	495,244
FY 2017	63,646	391,324	454,970	40,274	N/A	40,274	495,244
FY 2018	63,573	336,919	400,492	39,054	N/A	39,054	439,546

REI Phase 2 (REI2) Subproject (04-D-125-04)

(dollars in thousands)

	TEC Design 03-D-103	TEC Design/Construction 04-D-125	TEC, Total	OPC Except D&D	OPC, D&D	OPC Total	TPC
FY 2016	0	540,000	540,000	135,000	N/A	135,000	675,000
FY 2017	0	540,000	540,000	135,000	N/A	135,000	675,000
FY 2018	0	488,040	488,040	145,210	N/A	145,210	633,250

04-D-125-05, PF-4 Equipment Installation Phase 1 (PEI1)

(dollars in thousands)

	TEC Design 03-D-103	TEC Design/Construction 04-D-125	TEC, Total	OPC Except D&D	OPC, D&D	OPC Total	TPC
FY 2016	0	1,071,000	1,071,000	240,000	54,000	294,000	1,365,000
FY 2017	0	257,595	257,595	57,405	N/A	57,405	315,000
FY 2018	0	292,300	292,300	101,700	N/A	101,700	394,000

04-D-125-06, PF-4 Equipment Installation Phase 2 (PEI2)

(dollars in thousands)

	TEC Design 03-D-103	TEC Design/Construction 04-D-125	TEC, Total	OPC Except D&D	OPC, D&D	OPC Total	TPC
FY 2017	0	471,500	471,500	159,500	54,000	213,500	685,000
FY 2018	0	475,538	475,538	145,802	54,000	199,802	675,340

[a] Beginning in the FY 2016 CPDS, the completed subproject (RLUOB) and cancelled subproject (NF) total costs have been adjusted to match final expenditures. Final costs adjusted to account for official contract closeout of all past CMRR design and construction contracts.

04-D-125-07, Re-categorizing RLUOB to HC3 (RC3)

(dollars in thousands)

	TEC Design 03-D-103	TEC Design/Construction 04-D-125	TEC, Total	OPC Except D&D	OPC, D&D	OPC Total	TPC
FY 2017	0	289,405	289,405	75,595	N/A	75,595	365,000
FY 2018	0	270,952	270,952	68,382	N/A	68,382	339,334

Project Scope and Justification

Scope

The CMRR Project as originally proposed relocated and consolidated mission critical analytical chemistry (AC), material characterization (MC), and actinide research and development (R&D) capabilities, and provided special nuclear material (SNM) storage and large vessel handling capabilities. The SNM storage and large vessel handling capabilities originally planned for CMRR-NF are not included in the current set of CMRR subprojects. This data sheet provides information related to four subprojects to transition AC and MC capabilities into RLUOB and PF-4 to ensure continuity in plutonium support capabilities and enable the cessation of program operations in CMR.

The complete list of CMRR line item subprojects since inception are:

- **RLUOB Subproject (04-D-125-01):** Construction of a 203,686, gross square foot (gsf) facility to house laboratory space capable of handling radiological quantities of SNM; a 22,071 gsf utility building sized to provide utility services (including chilled and hot water, potable hot/cold water, compressed air, and process gases) for all CMRR facility elements; office space for CMRR workers located outside of perimeter security protection systems; and space for centralized TA-55 training activities. The RLUOB became fully functional and operational after the completion of the equipment installation effort for this facility in the REI phase.

- **RLUOB Equipment Installation (REI) Subproject (04-D-125-02):** Equipment installation included gloveboxes, hoods, AC/MC instrumentation, security and communication hardware, and final facility tie-ins and operational readiness/turnover activities. RLUOB equipment fabrication, installation, testing, and acceptance physically completed in FY 2012. Staff occupation of the office spaces has occurred and CD-4 has been approved. The facility exceeded its sustainability goal of LEED Silver by achieving LEED Gold in June 2012.

- **Nuclear Facility (NF) Subproject (04-D-125-03):** This subproject is cancelled with the remaining mission need (excluding SNM storage and large vessel handling) for CMRR to be met by REI2, PEI1, PEI2, and RC3.

- **REI Phase 2 (REI2) Subproject (04-D-125-04):** Maximizes the use of RLUOB laboratories by both reconfiguring some existing laboratory space and equipping empty laboratories with AC and MC capabilities. The RLUOB will operate at the increased radiological limit, 38.6 g of Pu-239 equivalent, consistent with the new limit established by NNSA Supplemental Guidance NA-1 SD G 1027, which enables additional AC and MC operations to move in. New gloveboxes/hoods and equipment will be installed in RLUOB through this subproject. This project makes progress toward ceasing program operations in CMR. Specific capabilities in REI2 scope include, but are not limited to the following:
    - Trace Elements Sample Preparation
    - Mass Spectrometry Sample Preparation
    - X-Ray Fluorescence Sample Preparation and Instruments
    - Radiochemistry Counting Laboratory and Sample Preparation
    - Oxide and Metal Sample Distribution
    - Coulometry
    - AC and MC Capabilities for R&D and Troubleshooting

- **PF-4 Equipment Installation Phase 1 (PEI1) Subproject (04-D-125-05):** The PEI1 subproject involves the following: relocation of existing PF-4 processes to create open consolidated space, reusing existing gloveboxes for new processes, decontamination and decommissioning (D&D) of old gloveboxes/equipment in PF-4 to create open laboratory space; and, installation of new gloveboxes/equipment in the created open space. PEI1 will support the AC and MC capabilities that require the processing of larger amounts of nuclear material. This project makes progress toward ceasing program operations in CMR. These capabilities support pit production, pit surveillance, plutonium science and other national security programs. The removal work will be executed as site-prep work within this subproject. Specific capabilities in PEI1 scope include, but are not limited to the following:

- Sample Preparation Surface Science
- Mechanical Testing
- Physical Properties
- Small Sample Fabrication and Preparation

- **PF-4 Equipment Installation Phase 2 (PEI2) Subproject (04-D-125-06):** Maximize use of PF-4 by consolidating and relocating existing capabilities, replacing existing equipment, installing gloveboxes and equipment and D&D of existing laboratory space for AC/MC capabilities. PEI2 will establish enduring AC and MC capabilities for supporting NNSA actinide-based missions. Specific capabilities in PEI2 scope include, but are not limited to the following:
  - Physical Properties
  - Small Sample Fabrication and Preparation
  - Mechanical Testing
  - Sample Preparation
  - Surface Science

- **Re-categorizing RLUOB to Hazard Category-3 (RC3) Subproject (04-D-125-07):** Maximize use of RLUOB by reconfiguring existing laboratory space, equipping the remaining empty laboratories with AC and MC capabilities, and re-categorizing RLUOB to a hazard category-3 facility with a material limit of 400 grams of Pu-239 equivalent. RC3 will establish enduring AC and MC capabilities for supporting NNSA actinide-based missions. Specific capabilities in RC3 scope include, but are not limited to the following:
  - AC Sample Preparation
  - Pu Assay
  - Interstitial Analysis
  - Beryllium Analysis

Justification

As defined in the most recent revision of the Mission Need Statement (MNS), the mission of the Chemistry and Metallurgy Research Replacement Project is to ensure continuity in enduring analytical chemistry and materials characterization capabilities for NNSA actinide-based missions in support of stockpile stewardship. The AC and MC capabilities provided by this project support pit production, pit surveillance, plutonium science and other national security programs. During development of the plutonium strategy, the joint DOD-CAPE business case analysis (BCA) indicated that optimizing RLUOB and repurposing space in PF-4 should be started as soon as possible to maintain continuity in AC and MC capabilities.

The project is being conducted in accordance with the project management requirements in DOE Order 413.3B, Program and Project Management for the Acquisition of Capital Assets.

Funds appropriated for this project may be used to provide independent assessments and other direct contractual support determined necessary by the FPD for the planning and execution of this project.

Financial Schedule

Prior Subprojects (RLUOB/REI/Nuclear Facility)

	(dollars in thousands)			
	Appropriations	**Plan**	**Obligations**	**Cost**
Design (03-D-103-010)				
FY 2004	N/A	9,500	N/A	0
FY 2005	N/A	13,567	N/A	1,848
FY 2006	N/A	27,910	N/A	19,147
FY 2007	N/A	14,161	N/A	27,213
FY 2008	N/A	0	N/A	15,079
FY 2009	N/A	0	N/A	-329
FY 2010	N/A	0	N/A	44
FY 2011	N/A	0	N/A	0
FY 2012	N/A	-1,492	N/A	339
FY 2013	N/A	0	N/A	188
FY 2014	N/A	0	N/A	44
FY 2015	N/A	0	N/A	0
FY 2016	N/A	-73	N/A	0
Total Design (03-D-103-010)	**N/A**	**63,573**	N/A	**63,573**
Design (04-D-125)				
FY 2007	N/A	11,489	N/A	3,109
FY 2008	N/A	41,581	N/A	24,713
FY 2009	N/A	92,196	N/A	47,102
FY 2010	N/A	57,000	N/A	62,252
FY 2011	N/A	146,699	N/A	101,924
FY 2012	N/A	38,610	N/A	132,593
FY 2013	N/A	0	N/A	15,158
FY 2014	N/A	0	N/A	724 [a]
FY 2015	N/A	0	N/A	-646 [a]
FY 2016	N/A	0	N/A	0
FY 2017	N/A	-646	N/A	0
Total Design (04-D-125)	**N/A**	**386,929**	N/A	**386,929**
Total Design				
FY 2004	N/A	9,500	N/A	0
FY 2005	N/A	13,567	N/A	1,848
FY 2006	N/A	27,910	N/A	19,147
FY 2007	N/A	25,650	N/A	30,322
FY 2008	N/A	41,581	N/A	39,792
FY 2009	N/A	92,196	N/A	46,773
FY 2010	N/A	57,000	N/A	62,296
FY 2011	N/A	146,699	N/A	101,924
FY 2012	N/A	37,118	N/A	132,932
FY 2013	N/A	0	N/A	15,346

[a] Due to the requirement to manage the program at the subproject level in FY 2016, a full reconciliation was conducted in FY 2017 to ensure appropriations, obligations and costs were aligned appropriately between subprojects and cost elements.

	(dollars in thousands)			
	Appropriations	**Plan**	**Obligations**	**Cost**
FY 2014	N/A	0	N/A	768
FY 2015	N/A	0	N/A	-646 [a]
FY 2016	N/A	-73	N/A	0
FY 2017	N/A	-646	N/A	0
Total Design	**N/A**	**450,502**	N/A	**450,502**
Construction (04-D-125)				
FY 2004	N/A	9,941	N/A	0
FY 2005	N/A	39,684	N/A	0
FY 2006	N/A	54,450	N/A	15,933
FY 2007	N/A	41,933	N/A	29,214
FY 2008	N/A	32,560	N/A	50,236
FY 2009	N/A	4,998	N/A	62,288
FY 2010	N/A	40,000	N/A	40,515
FY 2011	N/A	59,000	N/A	82,942
FY 2012	N/A	14,795	N/A	16,306
FY 2013	N/A	0	N/A	-5
FY 2014	N/A	0	N/A	-68
FY 2015	N/A	0	N/A	-1,264 [a]
FY 2016	N/A	0	N/A	-14
FY 2017	N/A	-1,278	N/A	0
Total Construction (04-D-125)	**N/A**	**296,083**	N/A	**296,083**
Total TEC				
FY 2004	N/A	19,441	N/A	0
FY 2005	N/A	53,251	N/A	1,848
FY 2006	N/A	82,360	N/A	35,080
FY 2007	N/A	67,583[a]	N/A	59,536
FY 2008	N/A	74,141	N/A	90,028
FY 2009	N/A	97,194	N/A	109,061
FY 2010	N/A	97,000	N/A	102,811
FY 2011	N/A	205,699	N/A	184,866
FY 2012	N/A	51,913	N/A	149,238
FY 2013	N/A	0	N/A	15,341
FY 2014	N/A	0	N/A	700 [a]
FY 2015	N/A	0	N/A	-1,910 [a]
FY 2016	N/A	-73	N/A	-14
FY 2017	N/A	-1,924	N/A	0
Total TEC	**N/A**	**746,585**	N/A	**746,585**

[a] Due to the requirement to manage the program at the subproject level in FY 2016, a full reconciliation was conducted in FY 2017 to ensure appropriations, obligations and costs were aligned appropriately between subprojects and cost elements.

	(dollars in Thousands)			
	Appropriations	**Plan**	**Obligations**	**Cost**
Other Project Cost (OPC)				
(OPC except D&D)				
FY 2002	N/A	1,665	N/A	1,665
FY 2003	N/A	12,177	N/A	10,853
FY 2004	N/A	7,214	N/A	7,702
FY 2005	N/A	7,164	N/A	4,934
FY 2006	N/A	1,209	N/A	4,265
FY 2007	N/A	4,187	N/A	1,196
FY 2008	N/A	0	N/A	2,335
FY 2009	N/A	9,000	N/A	9,075
FY 2010	N/A	14,403	N/A	14,666
FY 2011	N/A	30,668	N/A	19,240
FY 2012	N/A	1,034 [a]	N/A	9,142
FY 2013	N/A	0	N/A	3,665
FY 2014	N/A	0	N/A	-17
FY 2015	N/A	0	N/A	0
Total OPC except D&D (04-D-125)	**N/A**	**88,721**	N/A	**88,721**
Total Project Cost (TPC)				
FY 2002	N/A	1,665	N/A	1,665
FY 2003	N/A	12,177	N/A	10,853
FY 2004	N/A	26,655	N/A	7,702
FY 2005	N/A	60,415	N/A	6,782
FY 2006	N/A	83,569	N/A	39,345
FY 2007	N/A	71,770 [a]	N/A	60,732
FY 2008	N/A	74,141	N/A	92,363
FY 2009	N/A	106,194	N/A	118,136
FY 2010	N/A	111,403	N/A	117,477
FY 2011	N/A	236,367	N/A	204,106
FY 2012	N/A	52,947 [a]	N/A	158,380
FY 2013	N/A	0	N/A	19,006
FY 2014	N/A	0	N/A	683 [a]
FY 2015	N/A	0	N/A	-1,910 [a]
FY 2016	N/A	-73	N/A	-14
FY 2017	N/A	-1,924	N/A	0
Total TPC (04-D-125)	**N/A**	**835,306**	N/A	**835,306**

[a] Due to the requirement to manage the program at the subproject level in FY 2016, a full reconciliation was conducted in FY 2017 to ensure appropriations, obligations and costs were aligned appropriately between subprojects and cost elements.

REI Phase 2 (REI2) Subproject (04-D-125-04)

(dollars in thousands)

	Appropriations	Plan	Obligations	Cost
Design (04-D-125)				
FY 2012	N/A	32,000	N/A	0
FY 2013	N/A	0	N/A	0
FY 2014	N/A	0	N/A	841 [a]
FY 2015	N/A	9,359 [a]	N/A	19,452 [a]
FY 2016	N/A	840	N/A	21,564
FY 2017	N/A	2,617	N/A	2,959
Total Design (04-D-125)	**N/A**	**44,816**	N/A	**44,816**
Construction (04-D-125)				
FY 2012	N/A	4,140 [a]	N/A	0
FY 2013	N/A	0	N/A	0
FY 2014	N/A	0	N/A	0
FY 2015	N/A	0	N/A	3,299
FY 2016	N/A	107,160	N/A	29,447
FY 2017	N/A	55,383	N/A	113,257
FY 2018	N/A	111,691	N/A	121,420
FY 2019	N/A	99,262	N/A	98,937
FY 2020	N/A	60,270	N/A	59,562
FY 2021	N/A	5,318	N/A	17,302
Total Construction (04-D-125)	**N/A**	**443,224**	N/A	**443,224**
TEC (04-D-125)				
FY 2012	N/A	36,140 [a]	N/A	0
FY 2013	N/A	0	N/A	0
FY 2014	N/A	0	N/A	841 [a]
FY 2015	N/A	9,359 [a]	N/A	22,751 [a]
FY 2016	N/A	108,000	N/A	51,011
FY 2017	N/A	58,000	N/A	116,216
FY 2018	N/A	111,691	N/A	121,420
FY 2019	N/A	99,262	N/A	98,937
FY 2020	N/A	60,270	N/A	59,562
FY 2021	N/A	5,318	N/A	17,302
Total TEC (04-D-125)	**N/A**	**488,040**	N/A	**488,040**

[a] Due to the requirement to manage the program at the subproject level in FY 2016, a full reconciliation was conducted in FY 2017 to ensure appropriations, obligations and costs were aligned appropriately between subprojects and cost elements.

	(dollars in thousands)			
	Appropriations	Plan	Obligations	Cost
Other Project Cost (OPC)				
(OPC except D&D)				
FY 2012	N/A	8,049	N/A	0
FY 2013	N/A	0	N/A	0
FY 2014	N/A	0	N/A	4,371
FY 2015	N/A	79	N/A	363
FY 2016	N/A	9,000	N/A	3,061
FY 2017	N/A	17,000	N/A	14,032
FY 2018	N/A	15,334	N/A	20,077
FY 2019	N/A	50,000	N/A	37,375
FY 2020	N/A	30,000	N/A	40,329
FY 2021	N/A	15,748	N/A	25,602
Total OPC except D&D (04-D-125)	**N/A**	**145,210**	N/A	**145,210**
Total Project Cost (TPC)				
FY 2012	N/A	44,189 [a]	N/A	0
FY 2013	N/A	0	N/A	0
FY 2014	N/A	0	N/A	5,212 [a]
FY 2015	N/A	9,438 [a]	N/A	23,114 [a]
FY 2016	117,000	117,000	117,000	54,073
FY 2017	75,000	75,000	75,000	130,248
FY 2018	N/A	127,025	N/A	141,497
FY 2019	N/A	149,262	N/A	136,312
FY 2020	N/A	90,270	N/A	99,890
FY 2021	N/A	21,066	N/A	42,904
Total TPC (04-D-125)	**N/A**	**633,250**	N/A	**633,250**

PF-4 Equipment Installation Phase 1 (PEI1) Subproject (04-D-125-05)

	(dollars in thousands)			
	Appropriations	Plan	Obligations	Cost
Design (04-D-125)				
FY 2012	N/A	8,300	N/A	0
FY 2013	N/A	0	N/A	0
FY 2014	N/A	0	N/A	0
FY 2015	N/A	17,262 [a]	N/A	18,942 [a]
FY 2016	N/A	6,171	N/A	12,035
FY 2017	N/A	2,575	N/A	3,331
FY 2018	N/A	0	N/A	0
FY 2019	N/A	0	N/A	0
Total Design (04-D-125)	**N/A**	**34,308**	N/A	**34,308**
Construction (04-D-125)				
FY 2012	N/A	48,497 [a]	N/A	0
FY 2013	N/A	0	N/A	0
FY 2014	N/A	0	N/A	0
FY 2015	N/A	0	N/A	7,891
FY 2016	N/A	9,016	N/A	14,569
FY 2017	N/A	66,022	N/A	53,730

	(dollars in thousands)			
	Appropriations	**Plan**	**Obligations**	**Cost**
FY 2018	N/A	28,499	N/A	75,844
FY 2019	N/A	45,580	N/A	44,776
FY 2020	N/A	54,574	N/A	49,741
FY 2021	N/A	5,804	N/A	11,441
Total Construction (04-D-125)	**N/A**	**257,992**	N/A	**257,992**
TEC (04-D-125)				
FY 2012	N/A	56,797 [a]	N/A	0
FY 2013	N/A	0	N/A	0
FY 2014	N/A	0	N/A	0
FY 2015	N/A	17,262 [a]	N/A	26,833 [a]
FY 2016	N/A	15,187	N/A	26,604
FY 2017	N/A	68,597	N/A	57,061
FY 2018	N/A	28,499	N/A	75,844
FY 2019	N/A	45,580	N/A	44,776
FY 2020	N/A	54,574	N/A	49,741
FY 2021	N/A	5,804	N/A	11,441
Total TEC (04-D-125)	**N/A**	**292,300**	N/A	**292,300**
Total Other Project Cost (OPC)				
FY 2012	N/A	8,559[a]	N/A	0
FY 2013	N/A	0	N/A	0
FY 2014	N/A	0	N/A	4,089
FY 2015	N/A	0	N/A	413
FY 2016	N/A	0	N/A	3,280
FY 2017	N/A	7,018	N/A	7,795
FY 2018	N/A	21,715	N/A	21,715
FY 2019	N/A	25,000	N/A	24,221
FY 2020	N/A	23,600	N/A	13,589
FY 2021	N/A	15,808	N/A	26,598
Total OPC (04-D-125)	**N/A**	**101,700**	N/A	**101,700**
Total Project Cost (TPC)				
FY 2012	N/A	65,356 [a]	N/A	0
FY 2013	N/A	0	N/A	0
FY 2014	N/A	0	N/A	4,089
FY 2015	N/A	17,262 [a]	N/A	27,246 [a]
FY 2016	15,187	15,187	15,187	29,884
FY 2017	75,615	75,615	75,615	64,856

[a] Due to the requirement to manage the program at the subproject level in FY 2016, a full reconciliation was conducted in FY 2017 to ensure appropriations, obligations and costs were aligned appropriately between subprojects and cost elements.

	(dollars in thousands)			
	Appropriations	**Plan**	**Obligations**	**Cost**
FY 2018	N/A	50,214	N/A	97,559
FY 2019	N/A	70,580	N/A	68,997
FY 2020	N/A	78,174	N/A	63,330
FY 2021	N/A	21,612	N/A	38,039
Total TPC (04-D-125)	**N/A**	**394,000**	N/A	**394,000**

PF-4 Equipment Installation Phase 2 (PEI2) Subproject (04-D-125-06)

	(dollars in thousands)			
	Appropriations	**Plan**	**Obligations**	**Cost**
Design (04-D-125)			N/A	
FY 2012	N/A	0	N/A	0
FY 2013	N/A	0	N/A	0
FY 2014	N/A	0	N/A	0
FY 2015	N/A	9,000 [a]	N/A	0
FY 2016	N/A	8,500	N/A	16,272
FY 2017	N/A	0	N/A	1,228
FY 2018	N/A	0	N/A	0
FY 2019	N/A	15,253	N/A	12,261
FY 2020	N/A	14,200	N/A	17,192
Total Design (04-D-125)	**N/A**	**46,953**	N/A	**46,953**
Construction (04-D-125)				
FY 2012	N/A	0	N/A	0
FY 2013	N/A	0	N/A	0
FY 2014	N/A	0	N/A	0
FY 2015	N/A	0	N/A	0
FY 2016	N/A	14,923	N/A	14,923
FY 2017	N/A	8,000	N/A	8,000
FY 2018	N/A	2,718	N/A	2,710
FY 2019	N/A	0	N/A	0
FY 2020	N/A	20,956	N/A	20,956
FY 2021	N/A	126,988	N/A	75,000
FY 2022	N/A	155,000	N/A	90,000
FY 2023	N/A	100,000	N/A	90,000
FY 2024	N/A	0	N/A	80,000
FY 2025	N/A	0	N/A	46,996
FY 2026	N/A	0	N/A	0
Total Construction (04-D-125)	**N/A**	**428,585**	N/A	**428,585**
TEC				
FY 2012	N/A	0	N/A	0
FY 2013	N/A	0	N/A	0
FY 2014	N/A	0	N/A	0
FY 2015	N/A	9,000	N/A	0
FY 2016	N/A	23,423	N/A	31,195
FY 2017	N/A	8,000	N/A	9,228
FY 2018	N/A	2,718	N/A	2,710
FY 2019	N/A	15,253	N/A	12,261

(dollars in thousands)

	Appropriations	Plan	Obligations	Cost
FY 2020	N/A	35,156	N/A	38,148
FY 2021	N/A	126,988	N/A	75,000
FY 2022	N/A	155,000	N/A	90,000
FY 2023	N/A	100,000	N/A	90,000
FY 2024	N/A	0	N/A	80,000
FY 2025	N/A	0	N/A	46,996
FY 2026	N/A	0	N/A	0
Total TEC (04-D-125)	**N/A**	**475,538**	N/A	**475,538**
Other Project Cost (OPC) (OPC except D&D)				
FY 2012	N/A	296 [a]	N/A	0
FY 2013	N/A	0	N/A	0
FY 2014	N/A	0	N/A	0
FY 2015	N/A	0	N/A	0
FY 2016	N/A	0	N/A	296
FY 2017	N/A	0	N/A	0
FY 2018	N/A	0	N/A	0
FY 2019	N/A	0	N/A	0
FY 2020	N/A	2,000	N/A	2,000
FY 2021	N/A	20,469	N/A	10,469
FY 2022	N/A	30,000	N/A	20,000
FY 2023	N/A	90,000	N/A	20,000
FY 2024	N/A	3,037	N/A	30,000
FY 2025	N/A	0	N/A	43,000
FY 2026	N/A	0	N/A	20,037
Total OPC except D&D (04-D-125)	**N/A**	**145,802**	N/A	**145,802**
Other Project Cost (OPC) D&D				
FY 2022	N/A	10,000	N/A	0
FY 2023	N/A	30,000	N/A	0
FY 2024	N/A	14,000	N/A	10,000
FY 2025	N/A	0	N/A	30,000
FY 2026	N/A	0	N/A	14,000
Total OPC D&D (04-D-125)	**N/A**	**54,000**	**54,000**	**54,000**
Total Other Project Cost (OPC)				
FY 2012	N/A	296 [a]	N/A	0
FY 2013	N/A	0	N/A	0
FY 2014	N/A	0	N/A	0
FY 2015	N/A	0	N/A	0
FY 2016	N/A	0	N/A	296
FY 2017	N/A	0	N/A	0
FY 2018	N/A	0	N/A	0

[a] Due to the requirement to manage the program at the subproject level in FY 2016, a full reconciliation was conducted in FY 2017 to ensure appropriations, obligations and costs were aligned appropriately between subprojects and cost elements.

	(dollars in thousands)			
	Appropriations	Plan	Obligations	Cost
FY 2019	N/A	0	N/A	0
FY 2020	N/A	2,000	N/A	2,000
FY 2021	N/A	18,545	N/A	10,469
FY 2022	N/A	40,000	N/A	20,000
FY 2023	N/A	120,000	N/A	20,000
FY 2024	N/A	18,961	N/A	40,000
FY 2025	N/A	0	N/A	73,000
FY 2026	N/A	0	N/A	34,037
Total OPC (04-D-125)	**N/A**	**199,802**	N/A	**199,802**
Total Project Cost (TPC)				
FY 2012	N/A	296 [a]	N/A	0
FY 2013	N/A	0	N/A	0
FY 2014	N/A	0	N/A	0
FY 2015	N/A	9,000[a]	N/A	0
FY 2016	23,423	23,423	23,423	31,491
FY 2017	8,000 [a]	8,000	8,000 [b]	9,228 [c]
FY 2018	N/A	2,718	N/A	2,710
FY 2019	N/A	15,253	N/A	12,261
FY 2020	N/A	37,156	N/A	40,148
FY 2021	N/A	145,533	N/A	85,469
FY 2022	N/A	195,000	N/A	110,000
FY 2023	N/A	220,000	N/A	110,000
FY 2024	N/A	18,961	N/A	120,000
FY 2025	N/A	0	N/A	119,996
FY 2026	N/A	0	N/A	34,037
Total TPC (04-D-125)	**N/A**	**675,340**	N/A	**675,340**

Re-categorizing RLUOB to Hazard Category-3 (RC3) Subproject (04-D-125-07)

	(dollars in thousands)			
	Appropriations	Plan	Obligations	Cost
Design (04-D-125)				
FY 2012	N/A	0	N/A	0
FY 2013	N/A	0	N/A	0
FY 2014	N/A	0	N/A	0
FY 2015	N/A	0	N/A	0
FY 2016	N/A	0	N/A	0
FY 2017	N/A	0	N/A	0
FY 2018	N/A	0	N/A	0
FY 2019	N/A	0	N/A	3,000
FY 2020	N/A	32,000	N/A	28,000
FY 2021	N/A	12,000	N/A	13,000
Total Design (04-D-125)	**N/A**	**44,000**	N/A	**44,000**

[a] In FY 2017, $8.0 million was appropriated in project 17-D-126, PF-4 Reconfiguration Project, LANL.
[b] In FY 2017, $8.0 million was obligated in project 17-D-126, PF-4 Reconfiguration Project, LANL.
[c] Of this amount, $8.0 million will be costed in project 17-D-126, PF-4 Reconfiguration Project, LANL.

	(dollars in thousands)			
	Appropriations	**Plan**	**Obligations**	**Cost**
Construction (04-D-125)				
FY 2017	N/A	0	N/A	0
FY 2018	N/A	0	N/A	0
FY 2019	N/A	0	N/A	0
FY 2020	N/A	0	N/A	0
FY 2021	N/A	71,789	N/A	16,789
FY 2022	N/A	89,000	N/A	28,000
FY 2023	N/A	49,000	N/A	58,000
FY 2024	N/A	17,163	N/A	68,000
FY 2025	N/A	0	N/A	56,163
FY 2026	N/A	0	N/A	0
Total Construction (04-D-125)	**N/A**	**226,952**	N/A	**226,952**
Total TEC				
FY 2012	N/A	0	N/A	0
FY 2013	N/A	0	N/A	0
FY 2014	N/A	0	N/A	0
FY 2015	N/A	0	N/A	0
FY 2016	N/A	0	N/A	0
FY 2017	N/A	0	N/A	0
FY 2018	N/A	0	N/A	0
FY 2019	N/A	0	N/A	3,000
FY 2020	N/A	32,000	N/A	28,000
FY 2021	N/A	83,789	N/A	29,789
FY 2022	N/A	89,000	N/A	28,000
FY 2023	N/A	49,000	N/A	58,000
FY 2024	N/A	17,163	N/A	68,000
FY 2025	N/A	0	N/A	56,163
FY 2026	N/A	0	N/A	0
Total TEC	**N/A**	**270,952**	N/A	**270,952**

	(dollars in thousands)			
	Appropriations	**Plan**	**Obligations**	**Cost**
Other Project Cost (OPC)				
(OPC except D&D)				
FY 2012	N/A	639[a]	N/A	0
FY 2013	N/A	0	N/A	0
FY 2014	N/A	0	N/A	0
FY 2015	N/A	0	N/A	0
FY 2016	N/A	0	N/A	162
FY 2017	N/A	1,000	N/A	1,477
FY 2018	N/A	943	N/A	943
FY 2019	N/A	1,000	N/A	1,000
FY 2020	N/A	2,000	N/A	2,000
FY 2021	N/A	2,000	N/A	2,000
FY 2022	N/A	5,000	N/A	2,000
FY 2023	N/A	15,000	N/A	2,000
FY 2024	N/A	40,800	N/A	2,000
FY 2025	N/A	0	N/A	10,840
FY 2026	N/A	0	N/A	43,960
Total OPC except D&D (04-D-125)	**N/A**	**68,382**	N/A	**68,382**
Total Project Cost (TPC)				
FY 2012	N/A	639[a]	N/A	0
FY 2013	N/A	0	N/A	0
FY 2014	N/A	0	N/A	0
FY 2015	N/A	0	N/A	0
FY 2016	N/A	0	N/A	162
FY 2017	1,000[b]	1,000	1,000[c]	1,477[d]
FY 2018	N/A	943	N/A	943
FY 2019	N/A	1,000	N/A	4,000
FY 2020	N/A	34,000	N/A	30,000
FY 2021	N/A	85,789	N/A	31,789
FY 2022	N/A	94,000	N/A	30,000
FY 2023	N/A	64,000	N/A	60,000
FY 2024	N/A	57,963	N/A	70,000
FY 2025	N/A	0	N/A	67,003
FY 2026	N/A	0	N/A	43,960
Total TPC (04-D-125)	**N/A**	**339,334**	N/A	**339,334**

[a] Due to the requirement to manage the program at the subproject level in FY 2016, a full reconciliation was conducted in FY 2017 to ensure appropriations, obligations and costs were aligned appropriately between subprojects and cost elements.
[b] In FY 2017, $1.0 million was appropriated in project 17-D-125, RLUOB Reconfiguration Project, LANL.
[c] In FY 2017, $1.0 million was obligated in project 17-D-125, RLUOB Reconfiguration Project, LANL.
[d] Of this amount, $1.0 million will be costed in project 17-D-125, RLUOB Reconfiguration Project, LANL.

Total Project

	(dollars in thousands)			
	Appropriations	Plan	Obligations	Cost
Design (03-D-103-010)				
FY 2004	N/A	9,500	0	0
FY 2005	N/A	13,567	23,067	1,848
FY 2006	N/A	27,910	27,910	19,147
FY 2007	N/A	14,161	14,161	27,213
FY 2008	N/A	0	0	15,079
FY 2009	N/A	0	0	-329
FY 2010	N/A	0	0	44
FY 2011	N/A	0	0	0
FY 2012	N/A	-1,492	-1,492	339
FY 2013	N/A	0	0	188
FY 2014	N/A	0	0	44
FY 2015	N/A	0	0	0
FY 2016	N/A	-73	-73	0
FY 2017	N/A	0	0	0
Total Design (03-D-103-010)	**63,573**	**63,573**	**63,573**	**63,573**
Design (04-D-125)	-			
FY 2007	N/A	11,489	N/A	3,109
FY 2008	N/A	41,581	N/A	24,713
FY 2009	N/A	92,196	N/A	47,102
FY 2010	N/A	57,000	N/A	62,252
FY 2011	N/A	146,699	N/A	101,924
FY 2012	N/A	78,910 [a]	N/A	132,593
FY 2013	N/A	0	N/A	15,158
FY 2014	N/A	0	N/A	1,564
FY 2015	N/A	35,621 [b]	N/A	37,749 [b]
FY 2016	N/A	15,511	N/A	49,871
FY 2017	N/A	4,546	N/A	7,526
FY 2018	N/A	0	N/A	0
FY 2019	N/A	15,253	N/A	15,253
FY 2020	N/A	46,200	N/A	45,192
FY 2021	N/A	12,000	N/A	13,000
Total Design (04-D-125)	**557,006**	**557,006**	**557,006**	**557,006**
Total Design				
FY 2004	N/A	9,500	N/A	0
FY 2005	N/A	13,567	N/A	1,848
FY 2006	N/A	27,910	N/A	19,147
FY 2007	N/A	25,650	N/A	30,322
FY 2008	N/A	41,581	N/A	39,792
FY 2009	N/A	92,196	N/A	46,773

[a] Allocation erroneously categorized in FY 2017 CPDS; should have been construction, not design.
[b] Allocation and costs erroneously categorized in FY 2017 CPDS; should have been design, not construction.

	(dollars in thousands)			
	Appropriations	Plan	Obligations	Cost
FY 2010	N/A	57,000	N/A	62,296
FY 2011	N/A	146,699	N/A	101,924
FY 2012	N/A	77,418 [a]	N/A	132,932
FY 2013	N/A	0	N/A	15,346
FY 2014	N/A	0	N/A	1,609
FY 2015	N/A	35,621 [b]	N/A	37,748 [b]
FY 2016	N/A	15,438	N/A	49,871
FY 2017	N/A	4,546	N/A	7,518
FY 2018	N/A	0	N/A	0
FY 2019	N/A	15,253	N/A	15,261
FY 2020	N/A	46,200	N/A	45,192
FY 2021	N/A	12,000	N/A	13,000
Total Design	**620,579**	**620,579**	**620,579**	**620,579**
Construction (04-D-125)				
FY 2004	9,941	9,941	0	0
FY 2005	39,684	39,684	49,625	0
FY 2006	54,450	54,450	54,450	15,933
FY 2007	41,933	41,933	41,933	29,214
FY 2008	32,560	32,560	32,560	50,236
FY 2009	4,998	4,998	4,998	62,288
FY 2010	40,000	40,000	40,000	40,515
FY 2011	59,000	59,000	59,000	82,942
FY 2012	67,432 [a]	67,432 [a]	14,863	16,306
FY 2013	N/A	0	0	-5
FY 2014	N/A	0	52,569 [a]	-68
FY 2015	N/A	0	N/A	9,926
FY 2016	N/A	131,099	N/A	58,925
FY 2017	N/A	128,127	N/A	174,987
FY 2018	N/A	142,908	N/A	199,974
FY 2019	N/A	144,842	N/A	143,713
FY 2020	N/A	135,800	N/A	130,259
FY 2021	N/A	209,899	N/A	120,532
FY 2022	N/A	244,000	N/A	118,000
FY 2023	N/A	149,000	N/A	148,000
FY 2024	N/A	17,163	N/A	148,000
FY 2025	N/A	0	N/A	103,159
FY 2026	N/A	0	N/A	0
Total Construction (04-D-125)	**1,652,836**	**1,652,836**	**1,652,836**	**1,652,836**

[a] Allocation erroneously categorized in FY 2017 CPDS; should have been construction, not design.
[b] Allocation and costs erroneously categorized in FY 2017 CPDS; should have been design, not construction.

	(dollars in thousands)			
	Appropriations	**Plan**	**Obligations**	**Cost**
FY 2004	19,441	19,441	0	0
FY 2005	53,251	53,251	72,692	1,848
FY 2006	82,360	82,360	82,360	35,080
FY 2007	67,583	67,583	67,583	59,536
FY 2008	74,141	74,141	74,141	90,028
FY 2009	97,194	97,194	97,194	109,061
FY 2010	97,000	97,000	97,000	102,811
FY 2011	205,699	205,699	214,550	184,866
FY 2012	144,850[a]	144,850[a]	66,825	149,238
FY 2013	N/A	0	-7,000	15,341
FY 2014	N/A	0	76,174[a]	1,540
FY 2015	N/A	35,621[a]	N/A	47,675[a]
FY 2016	N/A	146,537	N/A	108,797
FY 2017	N/A	132,673	N/A	182,505
FY 2018	N/A	142,908	N/A	199,974
FY 2019	N/A	160,095	N/A	158,974
FY 2020	N/A	182,000	N/A	175,451
FY 2021	N/A	221,899	N/A	133,531
FY 2022	N/A	244,000	N/A	118,000
FY 2023	N/A	149,000	N/A	148,000
FY 2024	N/A	17,163	N/A	148,000
FY 2025	N/A	0	N/A	103,159
FY 2026	N/A	0	N/A	0
Total TEC	**2,273,415**	**2,273,415**	**2,273,415**	**2,273,415**
Other Project Costs (OPC)				
(OPC except D&D)				
FY 2002	1,665	1,665	1,665	1,665
FY 2003	12,177	12,177	12,177	10,853
FY 2004	7,214	7,214	7,214	7,702
FY 2005	7,164	7,164	7,164	4,934
FY 2006	1,209	1,209	1,209	4,265
FY 2007	4,187	4,187	4,187	1,196
FY 2008	0	0	0	2,335
FY 2009	9,000	9,000	9,000	9,075
FY 2010	14,403	14,403	14,403	14,666
FY 2011	30,668	30,668	30,668	19,240
FY 2012	18,577[a]	18,577[a]	1,034[a]	9,142
FY 2013	N/A	0	0	3,665
FY 2014	N/A	0	17,543	8,443
FY 2015	N/A	79	N/A	776
FY 2016	N/A	9,000	N/A	6,799
FY 2017	N/A	25,018	N/A	29,046
FY 2018	N/A	37,992	N/A	42,542

[a] OPC Appropriations, Allocations and Obligations erroneously entered in FY 2017 CPDS. Should have been classified as construction.

	(dollars in thousands)			
	Appropriations	**Plan**	**Obligations**	**Cost**
FY 2019	N/A	76,000	N/A	62,596
FY 2020	N/A	57,600	N/A	57,918
FY 2021	N/A	52,101	N/A	59,120
FY 2022	N/A	35,000	N/A	22,000
FY 2023	N/A	105,000	N/A	22,000
FY 2024	N/A	45,761	N/A	32,000
FY 2025	N/A	0	N/A	53,840
FY 2026	N/A	0	N/A	63,997
Total OPC except D&D	**549,815**	**549,815**	**549,815**	**549,815**
Other Project Cost (OPC) D&D				
FY 2022	10,000	10,000	10,000	0
FY 2023	30,000	30,000	30,000	0
FY 2024	14,000	14,000	14,000	10,000
FY 2025	0	0	0	30,000
FY 2026	0	0	0	14,000
Other Project Cost (OPC) D&D	**54,000**	**54,000**	**54,000**	**54,000**
OPC Total				
FY 2002	1,665	1,665	1,665	1,665
FY 2003	12,177	12,177	12,177	10,853
FY 2004	7,214	7,214	7,214	7,702
FY 2005	7,164	7,164	7,164	4,934
FY 2006	1,209	1,209	1,209	4,265
FY 2007	4,187	4,187	4,187	1,196
FY 2008	0	0	0	2,335
FY 2009	9,000	9,000	9,000	9,075
FY 2010	14,403	14,403	14,403	14,666
FY 2011	30,668	30,668	30,668	19,240
FY 2012	18,577 [a]	18,577 [a]	1,034 [a]	9,142
FY 2013	N/A	0	0	3,665
FY 2014	N/A	0	17,543 [a]	8,443
FY 2015	N/A	79	N/A	776
FY 2016	N/A	9,000	N/A	6,799
FY 2017	N/A	25,018	N/A	23,304
FY 2018	N/A	37,992	N/A	42,735
FY 2019	N/A	76,000	N/A	62,596
FY 2020	N/A	57,600	N/A	57,918
FY 2021	N/A	52,101	N/A	64,669
FY 2022	N/A	45,000	N/A	22,000
FY 2023	N/A	135,000	N/A	22,000
FY 2024	N/A	59,761	N/A	42,000
FY 2025	N/A	0	N/A	83,840
FY 2026	N/A	0	N/A	77,997
Total OPC	**603,815**	**603,815**	**603,815**	**603,815**

[a] OPC Appropriations, Allocations and Obligations erroneously entered in FY 2017 CPDS. Should have been classified as construction.

	(dollars in thousands)			
	Appropriations	**Plan**	**Obligations**	**Cost**
<u>**Total Project Costs (TPC)**</u>				
FY 2002	1,665	1,665	1,665	1,665
FY 2003	12,177	12,177	12,177	10,853
FY 2004	26,655	26,655	7,214	7,702
FY 2005	60,415	60,415	79,856	6,782
FY 2006	83,569	83,569	83,569	39,345
FY 2007	71,770	71,770	71,770	60,732
FY 2008	74,141	74,141	74,141	92,363
FY 2009	106,194	106,194	106,194	118,136
FY 2010	111,403	111,403	111,403	117,477
FY 2011	236,367	236,367	245,218	204,106
FY 2012	163,427	163,427	67,859	158,380
FY 2013	0	0	-7,000	19,006
FY 2014	0	0	93,717	9,983
FY 2015	35,700	35,700	35,700	48,451
FY 2016	155,610	155,537	155,537	115,596
FY 2017	159,615	157,691	150,442	212,559
FY 2018	180,900	180,900	190,073	241,516
FY 2019	236,095	236,095	236,095	221,562
FY 2020	239,600	239,600	239,600	233,369
FY 2021	274,000	274,000	274,000	192,652
FY 2022	289,000	289,000	289,000	140,000
FY 2023	284,000	284,000	284,000	170,000
FY 2024	75,000	76,924	75,000	190,000
FY 2025	0	0	0	186,999
FY 2026	0	0	0	77,996
Total TPC	**2,877,230**	**2,877,230**	**2,877,230**	**2,877,230**

Details of Project Cost Estimate

Prior Subprojects (RLUOB/REI/Nuclear Facility)

(dollars in thousands)

	Current Total Estimate	Previous Total Estimate	Original Validates Baseline
Total Estimate Cost (TEC)			
Design			
Design	N/A	N/A	N/A
Contingency	N/A	N/A	N/A
Total Design	**450,502**	**451,221**	**N/A**
Construction			
Site Work	N/A	N/A	N/A
Long-lead Equipment	N/A	N/A	N/A
Construction	N/A	N/A	N/A
Contingency	N/A	N/A	N/A
Total Construction	**296,083**	**296,083**	**N/A**
Total TEC	**746,585**	**747,304**	**N/A**
Contingency TEC			
Other Project Costs (OPC)			
OPC except D&D	N/A	N/A	N/A
Conceptual Planning	N/A	N/A	N/A
Conceptual Design	N/A	N/A	N/A
Contingency	N/A	N/A	N/A
Total OPC except D&D	**88,721**	**88,738**	**N/A**
D&D			
D&D	N/A	N/A	N/A
Contingency	N/A	N/A	N/A
Total D&D	**N/A**	**N/A**	**N/A**
Total OPC	**88,721**	**88,738**	**N/A**
Contingency OPC			
Total TPC	**835,306**	**836,042**	**N/A**
Total Contingency			

REI Phase 2 (REI2) Subproject (04-D-125-04)

	(dollars in thousands)		
	Current Total Estimate	**Previous Total Estimate**	**Original Validated Baseline**
Total Estimate Cost (TEC)			
Design			
Design			
Contingency			
Total Design	**44,816**	**96,000**	**44,816**
Construction			
Site Work	5,461		5,461
Long-lead Equipment	52,089		52,089
Construction	305,023		305,023
Contingency	80,651		80,651
Total Construction	**443,224**	**444,000**	**443,224**
Total TEC	**488,040**	**540,000**	**488,040**
Contingency TEC	80,651		80,651
Other Project Costs (OPC)			
OPC except D&D	81,070		81,070
Conceptual Planning	1,883		1,883
Conceptual Design	2,663		2,663
Contingency	59,594		59,594
Total OPC except D&D	**145,210**	**135,000**	**145,210**
D&D			
D&D			
Contingency			
Total D&D			
Total OPC	**145,210**	**135,000**	**145,210**
Contingency OPC	59,594		59,594
Total TPC	**633,250**	**675,000**	**633,250**
Total Contingency	**140,245**		**140,245**

PF-4 Equipment Installation Phase 1 (PEI1) Subproject (04-D-125-05)

(dollars in thousands)

	Current Total Estimate	Previous Total Estimate	Original Validated Baseline
Total Estimate Cost (TEC)			
Design			
Design			
Contingency			
Total Design	**34,308**	**22,500**	**34,308**
Construction			
Site Work	43,054		43,054
Long-lead Equipment	11,842		11,842
Construction	137,892		137,892
Contingency	65,204		65,204
Total Construction	**257,992**	**235,310**	**257,992**
Total TEC	**292,300**	**257,810**	**292,300**
Contingency TEC	65,204		65,204
Other Project Costs (OPC)			
OPC except D&D	63,686		63,686
Conceptual Planning	0		0
Conceptual Design	2,189		2,189
Contingency	35,825		35,825
Total OPC except D&D	**101,700**	**57,190**	**101,700**
D&D			
D&D			
Contingency			
Total D&D			
Total OPC	**101,700**	**57,190**	**101,700**
Contingency OPC	35,825		35,825
Total TPC	**394,000**	**315,000**	**394,000**
Total Contingency	**101,029**		**101,029**

PF-4 Equipment Installation Phase 2 (PEI2) Subproject (04-D-125-06)

	(dollars in thousands)		
	Current Total Estimate	**Previous Total Estimate**	**Original Validates Baseline**
Total Estimate Cost (TEC)			
Design			
Design			N/A
Contingency			N/A
Total Design	**46,953**	**14,500**	**N/A**
Construction			
Site Work			N/A
Long-lead Equipment			N/A
Construction			N/A
Contingency			N/A
Total Construction	**428,585**	**455,000**	**N/A**
Total TEC	**475,538**	**469,500**	**N/A**
Contingency TEC			N/A
Other Project Costs (OPC)			N/A
OPC except D&D			N/A
Conceptual Planning			N/A
Conceptual Design			N/A
Contingency			N/A
Total OPC except D&D	**145,802**	**161,500**	**N/A**
D&D			
D&D			N/A
Contingency			N/A
Total D&D	**54,000**	**54,000**	**N/A**
Total OPC	**199,802**	**215,500**	**N/A**
Contingency OPC			N/A
Total TPC	**675,340**	**685,000**	**N/A**
Total Contingency			**N/A**

Re-categorizing RLUOB to Hazard Category 3 (RC3) Subproject (04-D-125-07)

	(dollars in thousands)		
	Current Total Estimate	**Previous Total Estimate**	**Original Validates Baseline**
Total Estimate Cost (TEC)			
Design			
Design			N/A
Contingency			N/A
Total Design	**44,000**	**5,500**	**N/A**
Construction			
Site Work			N/A
Long-lead Equipment			N/A
Construction			N/A
Contingency			N/A
Total Construction	**226,952**	**285,905**	**N/A**
Total TEC	**270,952**	**291,405**	**N/A**
Contingency TEC			N/A
Other Project Costs (OPC)			N/A
OPC except D&D			N/A
Conceptual Planning			N/A
Conceptual Design			N/A
Contingency			N/A
Total OPC except D&D	**68,382**	**73,595**	**N/A**
D&D			
D&D			N/A
Contingency			N/A
Total D&D			**N/A**
Total OPC	**68,382**	**73,595**	**N/A**
Contingency OPC			N/A
Total TPC	**339,334**	**365,000**	**N/A**
Total Contingency			**N/A**

Total Project

	(dollars in thousands)		
	Current Total Estimate	**Previous Total Estimate**	**Original Validates Baseline**
Total Estimate Cost (TEC)			
Design			
Design			N/A
Contingency			N/A
Total Design	**620,579**	**541,721**	**N/A**
Construction			
Site Work			N/A
Long-lead Equipment			N/A
Construction			N/A
Contingency			N/A
Total Construction	**1,652,836**	**1,765,576**	**N/A**
Total TEC	**2,273,415**	**2,307,297**	**N/A**
Contingency TEC			N/A
Other Project Costs (OPC)			N/A
OPC except D&D			N/A
Conceptual Planning			N/A
Conceptual Design			N/A
Contingency			N/A
Total OPC except D&D	**549,815**	**463,721**	**N/A**
D&D			
D&D			N/A
Contingency			N/A
Total D&D	**54,000**	**54,000**	**N/A**
Total OPC	**603,815**	**517,721**	**N/A**
Contingency OPC			N/A
Total TPC	**2,877,230**	**2,877,303**	**N/A**
Total Contingency			**N/A**

Schedule of Appropriation Requests

(dollars in thousands)

Request		Prior Years	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	OutYears	Total
FY 2009	TEC	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	**TBD**
	OPC	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	**TBD**
	TPC	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	**TBD**
FY 2010	TEC	670,331	TBD	TBD	TBD	TBD	TBD	TBD	TBD	**TBD**
	OPC	86,814	TBD	TBD	TBD	TBD	TBD	TBD	TBD	**TBD**
	TPC	757,145	TBD	TBD	TBD	TBD	TBD	TBD	TBD	**TBD**
FY 2011	TEC	1,856,330	0	0	0	0	0	0	1,532,769	**3,389,099**
	OPC	105,401	0	0	0	0	0	0	300,500	**405,901**
	TPC	1,961,731	0	0	0	0	0	0	1,833,269	**3,795,000**
FY 2012	TEC	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	**TBD**
	OPC	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	**TBD**
	TPC	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	**TBD**
FY 2016	TEC	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	**N/A**
	OPC	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	**N/A**
	TPC	1,139,093	159,615	180,900	216,095	239,600	289,000	294,000	359,000	**2,877,303**
FY 2017	TEC	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	**N/A**
	OPC	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	**N/A**
	TPC	1,139,093	159,615	180,900	216,095	239,600	294,000	289,000	359,000	**2,877,303**
FY 2018	TEC	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	**N/A**
	OPC	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	**N/A**
	TPC	1,139,020	159,615	180,900	236,095	239,600	274,000	289,000	359,000	**2,877,230**

Related Operations and Maintenance Funding Requirements

Start of Operation or Beneficial Occupancy (fiscal quarter or date)	1QFY 2022
Expected Useful Life (number of years)	50
Expected Future Start of D&D of this capital asset (fiscal quarter)	1QFY 2072

(Related Funding requirements)

(dollars in thousands)

	Annual Costs		Life Cycle Costs	
	Current Total Estimate	**Previous Total Estimate**	**Current Total Estimate**	**Previous Total Estimate**
Operations	15,000	15,000	750,000	750,000
Utilities	3,500	3,500	175,000	175,000
Maintenance & Repair	6,500	6,500	325,000	325,000
Total	25,000	25,000	1,250,000	1,250,000

9. D&D Information

For RLUOB and REI, the new area being constructed by these subprojects replaces existing facilities; however, the costs of D&D of the facilities that are being replaced are not included in the costs of this construction project.

For REI2, PEI1, PEI2, and RC3, there is no new area (footprint) being constructed in these subprojects.

Current Future Years Nuclear Security Program (FYNSP) funding profiles do not include the funding for the D&D of the CMR Facility. CMR Facility D&D is not part of the CMRR project scope. Some removal of contaminated equipment in PF-4 will occur using project funds; these totals are reflected in the D&D totals.

Square footage associated with construction of the RLUOB and the Central Utility Building will be offset by LANL "banked excess" D&D space to meet the "one-for-one" requirement. Given planned new construction (including RLUOB) at LANL and planned excess facility reductions, LANL is projecting it will have banked adequate square footage before CMR is demolished.

	Square Feet
New area constructed previously by this project at Los Alamos National Laboratory……………………………………………………………………	225,757
Area of D&D in this project at Los Alamos National Laboratory …………	0
Area at Los Alamos National Laboratory to be transferred, sold, and/or D&D outside the project including area previously "banked"…………………………………………………………………………………………	225,757
Area of D&D in this project at other sites …………………………………………	0
Area at other sites to be transferred, sold, and/or D&D outside the project including area previously "banked"………………………………………	0
Total area eliminated ………………………………………………………………………	0

Acquisition Approach

The CMRR Acquisition Strategy is based on procurement strategies specific for each major component of the CMRR project in order to mitigate overall technical and schedule risk. The RLUOB was implemented via LANL-issued design-build subcontract based on performance specifications developed during CMRR Conceptual Design. The REI subproject was implemented via LANL-issued final design-bid build construction contracts. The REI2 subproject is being executed via LANL-issued final design-bid-build construction contracts. The PEI1 subproject is being executed, and the PEI2 subproject will be executed, via LANL-issued final design, and the construction will be self-performed in the PF-4. The RC3 subproject will be executed via LANL-issued final design-bid-build construction contract. Selected non-nuclear design and construction will be executed via the US Army Corps of Engineers. The performance baselines for each subproject will be established upon completion of 90% design maturity to allow development of credible cost estimates in accordance with DOE Order 413.3B and NNSA policy.

Secure Transportation Asset

Overview

The Secure Transportation Asset (STA) program safely and securely transports nuclear weapons, weapons components, and special nuclear materials to meet projected DOE, DOD, and other customer requirements.

The STA program includes Operations and Equipment and Program Direction subprograms. The Operations and Equipment subprogram provides for STA's transportation service infrastructure, which is critical in meeting the nuclear security enterprise initiatives documented in the Stockpile Stewardship and Management Plan. The Program Direction subprogram provides salaries, travel, and other related expenses for the federal agents and the secure transportation workforce.

The STA current mission capacity will meet the prioritized NNSA Stockpile refurbishment and modernization initiatives and other DOE workload. The Secure Transportation Steering Committee will continue to balance and prioritize customer requests against STA capacity. Since its formal creation in 1974, the program has maintained its long legacy of no loss of cargo and no radiological release on any shipment. However, aging transportation assets must be replaced in order to maintain the required convoy security profile.

Highlights of the FY 2018 Budget Request

The pillars of the STA security concept are specialized vehicles to include highly secure trailers, well trained agents, and robust communication systems. The $325,064,000 FY 2018 Budget Request is $87,946,000 or 37 percent above the FY 2016 enacted amount to support the continued Mobile Guardian Transporter (MGT) development; testing of the MGT including continuation of the baseline design efforts; and initiation of the procurement of parts and materials for production of the prototypes. In addition, the increased funding supports the Safeguards Transporter (SGT) risk reduction initiatives to extend the life of the SGT while the MGT is developed, replacement of vehicles and tractors, and restoration of federal agent strength levels to the numbers required to meet the STA mission capacity.

Since the earliest possible date to field MGT is FY 2024, STA implemented a risk reduction effort to keep a portion of the SGT fleet in operation beyond the 20-year service life. MGT is currently in design development and initial testing of components for the prototypes. The completion of the final baseline design review is scheduled for FY 2018 along with the fabrication of the initial prototype, P-1, with final integration, assembly, and test in FY 2019.

STA will conduct two Agent Candidate Training (ACT) classes in an effort to meet the required number of federal agents needed to meet mission capacity. STA must commit to a stable human resources strategy to achieve an optimal agent force structure and meet the nuclear security enterprise priorities and mission requirements. It takes many years to achieve any substantial growth in the agent force due to a 20 year retirement, stringent hiring process, and attrition.

Secure Transportation Asset
Funding

	(Dollars in Thousands)			
	FY 2016 Enacted	**FY 2017 Annualized CR***	**FY 2018 Request**	**FY 2018 vs FY 2016**
Secure Transportation Asset (STA)				
Operations and Equipment	140,000	157,820	219,464	+79,464
Program Direction - Albuquerque	97,118	98,618	105,600	+8,482
Total, Secure Transportation Asset	**237,118**	**256,438**	**325,064**	**+87,946**
Federal FTEs - Program Direction Funded	523	541	554	+31
Federal FTEs - WCF Funded	0	0	0	0
Total FTEs	**523**	**541**	**554**	**+31**

* The FY 2017 Annualized CR amounts reflect the P.L. 114-254 continuing resolution level annualized to a full year. These amounts are shown only at the congressional control level and above, below that level, a dash (-) is shown.

Secure Transportation Asset
Funding

(Dollars in Thousands)

	FY 2016 Enacted	FY 2017 Annualized CR*	FY 2018 Request	FY 2018 vs FY 2016
Secure Transportation Asset (STA)				
Operations and Equipment				
Mission Capacity	67,220	54,178	58,550	-8,670
Security/Safety Capability	21,073	18,166	25,505	+4,432
Infrastructure and C5 Systems	24,267	28,001	36,216	+11,949
Program Management	10,090	9,551	10,643	+553
Mobile Guardian Transporter	17,350	47,924	88,550	+71,200
Total, Operations and Equipment	**140,000**	**157,820**	**219,464**	**+79,464**
Program Direction - Albuquerque				
Salaries and Benefits	80,193	79,609	84,600	+4,407
Travel	4,657	5,096	5,202	+545
Other Related Expenses	12,268	13,913	15,798	+3,530
Total, Program Direction - Albuquerque	**97,118**	**98,618**	**105,600**	**+8,482**
Total, Secure Transportation Asset	**237,118**	**256,438**	**325,064**	**+87,946**
Federal FTEs - Program Direction Funded	523	541	554	+31
Federal FTEs - WCF Funded	0	0	0	0
Total FTEs	**523**	**541**	**554**	**+31**

* The FY 2017 Annualized CR amounts reflect the P.L. 114-254 continuing resolution level annualized to a full year. These amounts are shown only at the congressional control level and above, below that level, a dash (-) is shown.

Secure Transportation Asset
Explanation of Major Changes
(Dollars in Thousands)

	FY 2018 vs FY 2016
Secure Transportation Asset	
Operations and Equipment: The overall funding increase from FY 2016 – FY 2018 is $79.5 million, while the FY 2017 Request to FY 2018 increase is $61.6 million. Virtually all of this increase is for the MGT program, which follows a historical research and development funding profile, and steadily increases during development and testing and decreases as the program gets closer to production. The MGT program development schedule includes significant increases in FY 2017 and FY 2018 for completion of the Electronics and Auxiliary System Design; Active Delay System Design; Enhanced Cargo Restraint Development; as well as Assembly, Integration, and Testing of the two MGT prototypes. Specifically in FY 2018, this includes procurement initiation of long-lead parts an d materials for the two full scale MGT prototypes and conducting testing, verification, and validation of the Electronics System to prepare for the Prototype test fit beginning in FY 2019. In addition, the funding will support increased SGT Risk Reduction Initiatives to maintain the SGT until MGT is deployed, performance of deferred maintenance of existing facilities, purchase of Federal Agent equipment, and implementation of best practices in Emergency Management for federal agents.	+79,464
Program Direction: The funding increase supports efforts to increase the number of federal agent applicants including the updates of the job qualifications, Human Reliability Program (HRP) criteria, streamlined clearance processing, and capacity to process applicants. The increase also reflects higher training costs due to longer duration of training, increase in the number of courses for federal agents to maintain their skill sets, and STA’s portion of the Albuquerque Complex fees.	+8,482
Total, Secure Transportation Asset	**+87,946**

Secure Transportation Asset
Operations and Equipment

Description

Within the STA Operations and Equipment subprogram, five activities make unique contributions to the safety and security of the nuclear stockpile. These activities accomplish the following:

(1) Mission Capacity – provides mission-essential agent equipment; maintenance, modification, and replacement of the transportation fleet; and aviation services
(2) Security/Safety Capability - provides ACT to maintain the federal agent workforce; develops and implements new fleet technologies; executes agent sustainment training; and implements Security, Safety and Emergency Response programs, uniforms, or allowances as authorized by 5 U.S.C. 5901-5902
(3) Infrastructure and C5 systems - provides support for minor construction projects and C5 (command and control, communication, computer, and cyber) systems
(4) Program Management - provides corporate functions and business operations that control, assist, and direct secure transport operations
(5) Mobile Guardian Transporter (MGT) – provides the design, development, test, and fabrication of the MGT prototypes

The Mission Capacity activity sustains STA systems capacity through equipment purchases to fulfill the present transportation requirements. This includes the following activities:
(1) Replace the aging vehicle fleet with newly designed vehicles including the design, engineering, testing, and fielding of specialized vehicles, tractors, and trailers necessary for successful convoy operations
(2) Maintain the aviation program, to include the maintenance, sustainment, and replacement of the aircraft fleet
(3) Maintain the readiness posture of the STA fleet

Modernize Mission Assets and Infrastructure

STA must maintain assets to support current and future missions based on changing customer needs and threats. These assets include agent equipment, vehicles (tractors, trailers, and escort vehicles), and aircraft. Modernizing and sustaining these assets requires an integrated, long-term strategy and a substantial investment. The STA strategy includes eliminating outdated assets, refurbishing existing assets to extend their useful life, and procuring new assets.

Strengthen Mission Support Systems

Mission support systems provide the critical information necessary to ensure mission success. This includes the information that is obtained, analyzed, and disseminated prior to the mission, the continuous monitoring of that information to ensure it is accurate and valid, and the constant communication within the convoys and between the convoy and headquarters. This must be accomplished seamlessly in real-time while balancing the evolving requirements of cyber security to ensure system reliability and integrity. Additionally, STA will leverage other information technology systems supporting business processes and operations to improve the efficiency and effectiveness of the STA mission.

The Security/Safety Capability activity sustains STA systems capacity through safety and security upgrades. This includes the following activities:
(1) Identify, design, and test new fleet and mission technologies. Deliverables include safety and security upgrades as well as enhancements to the secure trailers, analysis of intelligence data, dissemination of information, and the application of emerging physical security technology
(2) Conduct ACT classes to maintain the agent end-strength, including the equipping and training of federal agent candidates
(3) Maintain specialized federal agent skills and qualifications sustain and support training to include technical equipment, logistics, curriculum development, and staffing necessary to conduct Special Response Force (SRF) training, Operational Readiness Training (ORT), Validation Force-on-Force (VFOF) exercises, and agent sustainment training. Sustainment training includes surveillance detection, tactics, advanced driving, and firearms. Contract for mission operation support and off-site training venues capable of supporting unit or command training

(4) Maintain security and safety programs. Includes liaison activities with state and local law enforcement organizations; analysis of security methods and equipment; vulnerability assessments; development of the Safeguards and Security Plan and combat simulation computer modeling; validation of safety and security; and execution of safety studies and safety engineering for the Safety Basis, Nuclear Explosive Safety, and over-the-road safety issues
(5) Maintain the NNSA Emergency Operations Center (EOC) in Albuquerque, New Mexico; train and exercise the STA response capability. Includes the Emergency Management Program, Federal Agent Incident Command System refresher, and sustainment training
(6) Initiate research on unmanned systems to determine viability for use in the STA mission to conduct safe and secure missions

The Infrastructure and command, and control, communication, computer, and cyber (C5) systems activity sustains the infrastructure and command and control system platforms operated by STA. This funding supports the following sub-elements:
(1) Modernize and maintain C5 systems activities to maintain vigilant oversight of nuclear convoys. Operate the Transportation Emergency Control Centers and New Mexico Relay Station, as well as communications systems maintenance across STA
(2) Expand, upgrade, and maintain the STA facilities and equipment in support of federal agents and projected workload. STA has approximately 68 facilities, many of which are in disrepair due to deferred maintenance. Includes utilities, maintenance, upgrades, and minor construction projects as necessary. Facilities include federal agent commands, vehicle mechanical and electronic maintenance facilities, relay station, training facilities, and facilities operated to house support staff
(3) Implement a secure unclassified to classified controlled interface; allowing communications from unclassified to classified systems, and develop a common operating picture for the Transportation and Emergency Control Center

The Program Management activity creates a well-managed, responsive, and accountable organization by employing effective business practices for the STA program. This goal includes:
(1) Consolidate corporate functions such as technical document support and business operations that control, assist, and direct secure transport operations including supplies, equipment, and regulation control processes
(2) Assess, evaluate, and improve work functions and processes including self-assessments, routine STA intranet support, configuration management, implementation of the Quality Assurance program, and business integration activities

The Mobile Guardian Transporter (MGT) activity provides for the design, development, testing, and production of the MGT, the replacement for the existing SGT. The MGT will assure the safety and security of existing and planned future cargo and containers, protect the public and meet nuclear explosive safety requirements associated with accident scenarios, reduce the risk to new security threats, and provide the means for enhanced communications. This includes the following activities:
(1) Prototype design and development
(2) Mechanical Systems Development
(3) Electronics and Auxiliary Systems Development
(4) Active Delay System (ADS) Development
(5) Assembly Integration and Test
(6) Enhanced Cargo Restraint Development

Operations and Equipment

Activities and Explanation of Changes

FY 2016 Enacted	FY 2018 Request	Explanation of Changes FY 2018 vs FY 2016
Operations and Equipment $140,000,000	**Operations and Equipment $219,464,000**	**Operations and Equipment +$79,464,000**
Mission Capacity $67,220,000	**Mission Capacity $58,549,549**	**Mission Capacity -$8,670,451**
• Accepted delivery of: 14 Escort Vehicle-light Chassis, eight Support Vehicles and seven Replacement Armored Tractors (RATs) • Initiated the re-compete of the aviation maintenance contract • Obtained International Standards for Business Aircraft Stage II Certification • Completed demolition of vehicles no longer in service	• Accept delivery of seven Escort Vehicle-light Chassis, eight Support Vehicles, and seven RATs • Award contract for the next generation RAT • Award aviation maintenance contract • Complete Analysis of Alternative (AoA) for Aircraft Replacement	The decrease represents: • As STA has reached a steady-state production for support vehicles, STA will produce fewer vehicles each FY • Completion of the Trailer Communications Project • Decrease of RAT production activities
Security/Safety Capability $21,073,000	**Security/Safety Capability $25,505,291**	**Security/Safety Capability +$4,432,291**
• Achieved full implementation of incumbent agent physical readiness training • Conducted 2 ACT classes • Performed Operational Readiness Training • Conducted Security Staff Assistance Visits	• Conduct 2 ACT classes • Implement a uniform and accredited National Incident Management System/Incident Command System (NIMS/ICS) training program for agents and staff • Conduct an operational emergency response exercise • Research and test unmanned systems to determine viability for use in the STA mission • Conduct Security Site Survey and Staff Assistance Visits	The increase reflects: • Program enhancements for NIMS/ICS training and implementation • Long-lead munitions purchases for training and real-world use • Continue research and test of unmanned systems • Procurement of operational training venues needed for agent sustainment training

FY 2016 Enacted	FY 2018 Request	Explanation of Changes FY 2018 vs FY 2016
Infrastructure and C5 Systems $24,267,000	**Infrastructure and C5 Systems $36,216,398**	**Infrastructure and C5 Systems +$11,949,398**
• Completed fielding and training of ARES and exploited tactical enhancements • Completed the Iridium global positioning system (GPS) V2 installation • Integrated the Mission Management System (MMS) and personnel management tools to provide near real-time personnel management at the unit level and built data files for metrics	• Implement increased capability for STA's MMS, a data warehouse for long-term storage of STA mission data • Move to zero client classified networks for Office of Secure Transportation (OST) owned classified systems (e.g. Red Dawn) • Provide for minor construction projects at the federal agent commands	• The increase reflects the performance of deferred facilities maintenance and minor construction projects at multiple sites including Ft. Chaffee, AR; Amarillo, TX; Oakridge, TN; and Albuquerque, NM
Program Management $10,090,000	**Program Management $10,642,762**	**Program Management +$552,762**
• Executed program with efficient support services • Executed OST-designated projects in accordance with an approved project management plan using prescribed estimating methods	• Execute program with efficient support services • Conduct Quality Assurance assessments • Continue corporate business services and integration activities	• The increase reflects inflation of Support Service Contractors and Management and Operating Contractors (M&O)
Mobile Guardian Transporter $17,350,000	**Mobile Guardian Transporter $88,550,000**	**Mobile Guardian Transporter +$71,200,000**
• Began systems prototyping • Initiated baseline design • Began identification process for production agency • Incorporated Nuclear Explosive Safety Studies into design • Completed preliminary cargo restraint system assessment • Completed Conceptual Design Review	• Initiate procurement of prototype materials and parts • Fabrication of prototypes to include electronic/ADS design and mechanical production • Testing, verification, and validation of the electronics system • Continuation of baseline design activities	• The increase supports the procurement process for long-lead parts and materials for the two full scale MGT prototypes • Conduct testing, verification, and validation of the electronics system to prepare for the prototype test fit beginning in FY 2019 and the necessary increase of M&O personnel to support the project • Address programmatic and technical risks associated with this development project • Key initiatives leading to production start in FY 2023 with first MGT production unit delivered in FY 2024

Secure Transportation Asset
Performance Measures

In accordance with the GPRA Modernization Act of 2010, the Department sets targets for, and tracks progress toward, achieving performance goals for each program.

	FY 2016	FY 2017	FY 2018
Performance Goal (Measure)	**Safe and Secure Shipments -** Annual percentage of shipments completed safely and securely without compromise/loss of nuclear weapons/components or a release of radioactive material.		
Target	100 % of shipments	100 % of shipments	100 % of shipments
Result	Met - 100	TBD	TBD
Endpoint Target	Annually, ensure that 100% of shipments are completed safely and securely without compromise/loss of nuclear weapons/components or a release of radioactive material.		

Secure Transportation Asset
Capital Summary

(Dollars in Thousands)

	Total	Prior Years	FY 2016 Enacted	FY 2016 Current	FY 2017 Annualized CR*	FY 2018 Request	FY 2018 vs FY 2016
Capital Operating Expenses Summary (including Major Items of Equipment (MIE))							
Capital Equipment >$500K (including MIE)	N/A	N/A	12,507	12,507	12,782	13,063	+556
Plant Projects (GPP and IGPP)	N/A	N/A	3,840	3,840	3,924	4,010	+170
Total, Capital Operating Expenses	**N/A**	**N/A**	**16,347**	**16,347**	**16,706**	**17,073**	**+726**
Capital Equipment > $500K (including MIE)							
Total Non-MIE Capital Equipment	N/A	N/A	12,507	12,507	12,782	13,063	+556
Total, Capital Equipment (including MIE)	**N/A**	**N/A**	**12,507**	**12,507**	**12,782**	**13,063**	**556**
Plant Projects (GPP and IGPP)							
Total Plant Projects (GPP/IGPP) (Total Estimated Cost (TEC) <$5M)	N/A	N/A	3,840	3,840	3,924	4,010	+170
Total, Plant Projects (GPP/IGPP)	N/A	N/A	**3,840**	**3,840**	**3,924**	**4,010**	**+170**
Total, Capital Summary	**N/A**	**N/A**	**16,347**	**16,347**	**16,706**	**17,073**	**+726**

* The FY 2017 Annualized CR amounts reflect the P.L. 114-254 continuing resolution level annualized to a full year. These amounts are shown only at the congressional control level and above, below that level, a dash (-) is shown.

Secure Transportation Asset
Program Direction

Description

The STA Program Direction subprogram provides personnel to support the security and safety of the nuclear stockpile. The total planned Full Time Equivalents (FTEs) support the federal agent force, federal pilots, emergency management, security and safety programs and other key elements of the STA mission. The subprogram includes execution of the Human Reliability Program (HRP), Albuquerque Complex fees, Department of Energy Common Operating Environment (DOECOE) Information Technology Infrastructure services, and support systems for staff.

Salaries and benefits are provided for the program staff located at Albuquerque, New Mexico; Fort Chaffee, Arkansas; and for federal agents and support staff at the three federal agent force locations in Albuquerque, New Mexico; Oak Ridge, Tennessee; and Amarillo, Texas. It also includes base payroll costs, overtime, worker's compensation, and health/retirement benefits associated with federal agents, secondary positions, and support staff. The total onboard count may not match the planned FTEs. Funding allocations account for projected/average vacancy rates over the entire year and may not match actual onboard FTEs at any given time.

Travel is associated with secure convoys, training at other federal facilities and military installations, and program oversight.

Other Related Expenses provides required certification training for the handling of nuclear materials by federal agent forces as well as staff professional development. Maintains the HRP for federal agents and designated staff. Provides for Permanent Change of Station (PCS) moves and other contractual service requirements to include facility maintenance, Albuquerque Complex fee, which includes a portion of the security fees, utilities, and other services rendered. In addition, provides payment for the DOECOE Information Technology infrastructure services.

Program Direction

Activities and Explanation of Changes

FY 2016 Enacted	FY 2018 Request	Explanation of Changes FY 2018 vs FY 2016
Program Direction $97,118,000	**Program Direction $105,600,000**	**Program Direction +$8,482,000**
Salaries and Benefits $80,193,000	**Salaries and Benefits $84,600,394**	**Salaries and Benefits +$4,407,394**
• Recruited, hired, and retained quality personnel based on an analysis of current and future mission needs • Filled agent vacancies to support workload requirements • Conducted Agent Candidate Training (ACT) classes	• Recruit, hire, and retain quality personnel based on an analysis of current and future mission needs • Continue to fill agent vacancies to support workload requirements • Continue to conduct ACT classes	• The increase supports efforts to increase the number of federal agent applicants including the updates of the job qualifications, HRP criteria, streamlined clearance processing, and capacity to process applicants in addition to the inflation applied to salaries and benefits
Travel $4,657,000	**Travel $5,202,186**	**Travel +$545,186**
• Supported travel required to transport nuclear weapons, components, and special nuclear material • Supported travel to federal facilities that provided unique training to maintain agent skill set • Supported travel to identify and validate safety and security requirements	• Continue to support travel required to transport nuclear weapons, components, and special nuclear material • Continue to support federal facilities that provide unique training to maintain agent skill sets • Continue to support travel to identify and validate safety and security requirements associated with the weapon consolidation initiatives	• The increase provides for the required travel in support of over-the-road mission requirement
Other Related Expenses $12,268,000	**Other Related Expenses $15,797,420**	**Other Related Expenses +$3,529,420**
• Applied HRP to ACT candidates • Provided for processing of security clearances • Provided tenant fees for the Albuquerque Complex • Completed federal agent candidate training at the Federal Law Enforcement Training Center (FLETC)	• Apply HRP to ACT candidates • Conduct federal agent candidate training at FLETC • Provide for processing of security clearances • Support for DOECOE and tenant fees	• The increase provides for the administration of the HRP requirements, higher training costs associated with the longer duration, increased number of courses for federal agents to maintain their skill sets, as well as higher IT Services costs and tenant fees

Defense Nuclear Security

Overview

The Defense Nuclear Security (DNS) program is an essential component of the nuclear security enterprise. The core mission is to develop and implement security programs, including protection, control, and accountability of materials, as well as the physical security of NNSA facilities, including the national laboratories, production plants, processing facilities, and the Nevada National Security Site (NNSS), which support NNSA missions.

In addition, DNS provides knowledge and expertise in nuclear security for a broad set of 21st century national security needs, in line with its core mission, such as those in defense nuclear nonproliferation, homeland security, and intelligence. The DNS program protects against a full spectrum of threats to NNSA personnel, facilities, nuclear material, and classified matter.

Highlights of the FY 2018 Budget Request

DNS executes the security program to meet mission needs, minimize risk, and ensure the highest priorities are met. DNS employs over 1,600 protective force officers, securing more than 4,400 buildings, and protecting over 49,800 personnel.

DNS provides protection for NNSA personnel, facilities, nuclear weapons, and materials from a full spectrum of threats, ranging from minor security incidents to acts of terrorism. The Budget Request for FY 2018 includes funding to fill positions in key security program areas at the sites, including protective forces, information security, technical surveillance countermeasures, and nuclear material control and accountability. It also includes planning and conceptual design funds for a series of future projects to sustain and recapitalize the Perimeter Intrusion Detection and Assessment Systems (PIDAS) at the Pantex Plant and Y-12 National Security Complex. The full scope of the PIDAS projects is still under review, but preliminary estimates are included within the recently completed 10-year Refresh Plan, and future budget requests will reflect the detailed funding requirements.

The Security Improvements Program (SIP) included $30,000,000 in one-time FY 2016 funds to begin addressing the backlog of security infrastructure upgrades needed to replace, maintain, and improve the reliability of aging systems, the preponderance of which are well beyond the manufacturer's lifecycle. In FY 2018, no additional funds are requested. DNS will provide an updated funding plan for SIP by project as directed in the Consolidated Appropriations Act, 2016.

In FY 2019, the Device Assembly Facility (DAF) Argus Line Item Project at the NNSS will reach completion. Remaining Other Project Costs (OPC) funds will be used for project certification and turnover to operations. Argus is the NNSA standard security system to integrate access control, intrusion detection, and video assessment of alarms for protection of high consequence assets.

Defense Nuclear Security
Funding

	(Dollars in Thousands)			
	FY 2016 Enacted	**FY 2017 Annualized CR***	**FY 2018 Request**	**FY 2018 vs FY 2016**
Defense Nuclear Security				
Operations and Maintenance				
Protective Forces	390,592	390,592	407,042	+16,450
Physical Security Systems	85,805	89,368	99,032	+13,227
Information Security	29,779	31,179	32,929	+3,150
Personnel Security	33,587	33,987	34,219	+632
Materials Control and Accountability	24,839	25,568	27,532	+2,693
Security Program Operations and Planning	75,289	77,818	86,223	+10,934
Total, Operations and Maintenance	**639,891**	**648,512**	**686,977**	**+47,086**
Security Improvements Program (SIP)	30,000	0	0	-30,000
Construction	13,000	13,000	0	-13,000
Total, Defense Nuclear Security	**682,891**	**661,512**	**686,977**	**+4,086**

* The FY 2017 Annualized CR amounts reflect the P.L. 114-254 continuing resolution level annualized to a full year. These amounts are shown only at the congressional control level and above, below that level, a dash (-) is shown.

Defense Nuclear Security
Explanation of Major Changes
(Dollars in Thousands)

	FY 2018 vs FY 2016
Defense Nuclear Security	
Operations and Maintenance: The increase reflects costs associated with renegotiation of the Pantex Guard Union Collective Bargaining Agreement; additional security systems maintenance and Argus modernization costs; OPC for future Perimeter Intrusion Detection and Assessment System (PIDAS) sustainment and recapitalization at Pantex and Y-12; and salary growth across all security program areas at the sites.	+47,086
Security Improvements Program (SIP): No change. The decrease in funding reflects a one-time addition of $30 million in FY 2016 to begin to address the backlog of security infrastructure upgrades. No follow on funding is requested in FY 2018.	-30,000
Construction: The decrease in funding reflects the completion of the second phase for the replacement of the Process Equipment and Control System (PECOS) system, including associated infrastructure, at the NNSS DAF with Argus. No follow on funding is requested in FY 2018.	-13,000
Total, Defense Nuclear Security	**+4,086**

Defense Nuclear Security
Operations and Maintenance

Description

Defense Nuclear Security Operations and Maintenance integrates personnel, equipment, and procedures to protect physical assets and resources against theft, sabotage, diversion, or other criminal acts. Each NNSA site or facility has an approved Site Security Plan detailing protection measures and resources needed to protect site security interests.

Protective Forces include duties, specialized training, performance testing, facilities, equipment, weapons/firearms, ammunition, vehicles, and other expenses. These forces are each site's primary front-line protection, consisting of armed, uniformed officers. Protective Forces are an integral part of a site's security posture and are trained in tactics and procedures necessary to protect site interests.

Physical Security Systems includes intrusion detection and assessment systems (IDAS), performance testing and certification/recertification, access control systems, barrier and delay mechanisms, canine explosive detection programs, and tactical systems. This also includes the centrally-managed Argus program for sites possessing Category I quantities of Special Nuclear Material (SNM). Many of the systems are in use well beyond their lifecycle and require increased maintenance and testing. Additional investment in critical security systems and infrastructure upgrade projects are necessary to sustain these systems.

Information Security provides classification guidance, technical surveillance countermeasures, operations security, and classified matter protection and control. This includes administrative requirements for maintaining security containers and combinations, marking, and control systems.

Personnel Security includes access authorizations, badging programs, Human Reliability Programs (HRP), control of classified and unclassified visits, and assignments by foreign nationals. It encompasses the administrative support to the site clearance process, including processes for security clearance determinations at each site to ensure that individuals are eligible for access to classified information or matter, and/or access to or control over SNM or nuclear weapons.

Materials Control and Accountability (MC&A) controls and accounts for special and alternate nuclear materials through measurements, quality assurance, accounting, containment, surveillance, and physical inventory. This activity also includes the Local Area Nuclear Material Accountability System (LANMAS) software application, as well as training and operational support provided to DOE and NNSA sites and facilities to use as the core of their nuclear accountability systems. The LANMAS software is used by 16 DOE sites, 4 of which are NNSA sites.

Security Program Operations and Planning includes: development of budgets; responses to audits and information requests, Site Security Plans, vulnerability/risk assessments, performance testing and assurance activities; security incident and reporting management; security surveys and self-assessments; activities related to deviation requests; and control of security technology transfer activities, processing facility clearances, and Foreign Ownership, Control, or Influence (FOCI) determinations for security contracts.

Operations and Maintenance

Activities and Explanation of Changes

FY 2016 Enacted	FY 2018 Request	Explanation of Changes FY 2018 vs FY 2016
Operations and Maintenance $639,891,000	**Operations and Maintenance $686,977,000**	**Operations and Maintenance +$47,086,000**
Protective Forces $390,592,000	**Protective Forces $407,042,000**	**Protective Forces +$16,450,000**
• Maintains sufficient protective forces to meet protection requirements based on approved vulnerability and risk assessments. • Addresses non-nuclear security protection requirements and “lower level threat” scenarios, in a graded, prioritized manner.	• Maintains sufficient protective forces to meet protection requirements based on approved vulnerability and risk assessments. • Addresses non-nuclear security protection requirements and “lower level threat” scenarios, in a graded, prioritized manner.	• Provides for sufficient protective forces staffing to meet approved protection requirements. • Includes additional $6 million planned, anticipated costs related to renegotiating the Pantex Guard Union Collective Bargaining Agreement.
Physical Security Systems $85,805,000	**Physical Security Systems $99,032,000**	**Physical Security Systems +$13,227,000**
• Funds preventive and corrective maintenance for physical security systems and infrastructure at NNSA sites, and provides protection against the threat as documented in the 2008 Graded Security Protection policy.	• Funds preventive and corrective maintenance for physical security systems and infrastructure at NNSA sites, and provides protection against the threat as documented in the 2008 Graded Security Protection policy.	• Funds increasing preventive and corrective maintenance for aging systems and infrastructure at NNSA sites, pending completion of upgrades/replacement.
Information Security $29,779,000	**Information Security $32,929,000**	**Information Security +$3,150,000**
• Maintains an information protection program and permits filling vacancies at several sites.	• Maintains an information protection program and permits filling vacancies at several sites.	• Funds backfilling of key vacancies in classification and technical security programs at several sites.
Personnel Security $33,587,000	**Personnel Security $34,219,000**	**Personnel Security +$632,000**
• Maintains a personnel security program while implementing efficiencies in a risk-based manner.	• Maintains a personnel security program while implementing efficiencies in a risk-based manner.	• Includes regular escalation and minor program adjustments at sites.

FY 2016 Enacted	FY 2018 Request	Explanation of Changes FY 2018 vs FY 2016
Materials Control and Accountability $24,839,000	**Materials Control and Accountability $27,532,000**	**Materials Control and Accountability +$2,693,000**
• Provides for control and accountability of special and alternative nuclear materials and maintains a level of effort that is a critical part of NNSA's layered protection program. • Continues implementation of the LANMAS software upgrade. • Permits backfill of key positions at several sites.	• Provides for control and accountability of special and alternative nuclear materials and maintains a level of effort that is a critical part of NNSA's layered protection program. • Continues implementation of the LANMAS software upgrade. • Permits backfill of key positions at several sites.	• Funds ongoing implementation of the LANMAS software upgrade and filling of key positions at several sites.
Security Program Operations and Planning $75,289,000	**Security Program Operations and Planning $86,223,000**	**Security Program Operations and Planning +$10,934,000**
• Maintains site security plans, risk/vulnerability assessment capabilities, budget development, management of site programs for incidents of security concern, and security awareness programs.	• Maintains site security plans, risk/vulnerability assessment capabilities, budget development, management of site programs for incidents of security concern, and security awareness programs. • Includes OPC for preliminary planning and design for future PIDAS replacements at Pantex and Y-12.	• Includes approximately $6 million for planning and conceptual design of future PIDAS sustainment and recapitalization projects at Pantex and Y-12. • Funds increased focus on site risk/vulnerability assessment capabilities, in support of updates to site security plans, and increased efforts on site programs for incidents of security concern, and security awareness.

Defense Nuclear Security
Security Improvements Program

Description

The DNS Security Improvements Program (SIP) was created with $30,000,000 in FY 2016 funds to begin addressing the backlog of security infrastructure projects needed to replace, maintain, and improve the reliability of aging systems, the preponderance of which are well beyond the manufacturer's useful lifecycle. SIP addresses projects above and beyond the base operating and maintenance cost of NNSA's physical security program. This does not include Line Item projects with a Total Project Cost greater than $10 million that represent capability upgrades and new construction.

The FY 2018 budget does not request additional funds for the SIP. DNS will provide an updated funding plan for SIP by project as directed in the Consolidated Appropriations Act, 2016. In addition to SIP projects, NNSA estimates over $2,000,000,000 may be needed over a 15-year period to address security infrastructure and PIDAS upgrades.

Security Improvements Program

Activities and Explanation of Changes

FY 2016 Enacted	FY 2018 Request	Explanation of Changes FY 2018 vs FY 2016
Security Improvements Program $30,000,000	**Security Improvements Program $0**	**Security Improvements Program -$30,000,000**
• Addresses security infrastructure upgrades to aging systems such as the Electronic Safeguards and Security System (E3S) at Savannah River-Tritium site and Legacy Field Panels at Los Alamos National Laboratory. • Develops a ten-year lifecycle plan for remaining systems.	• No follow on funding is requested in FY 2018.	• No follow on funding is requested.

Defense Nuclear Security
Construction

Description

The DNS Construction supports critical facilities within the nuclear security enterprise like Project 14-D-710, Device Assembly Facility (DAF) Argus Installation Project at the NNSS. The Argus project works in conjunction with and relies on both the Entry Guard Station Expansion and legacy completed projects. Argus is necessary to support the DAF complex, which is a critical facility within the nuclear security enterprise designed for the staging of SNM.

The Argus security system, once complete, will replace the aging PECOS in the DAF at the NNSS. Argus is the recommended NNSA enterprise security system and integrates access control, intrusion detection, and video assessment of alarms to protect and control high-consequence assets. Completion of this project provides the required security to protect SNM using capabilities of the HSPD-12 badge credentials.

Construction

Activities and Explanation of Changes

FY 2016 Enacted	FY 2018 Request	Explanation of Changes FY 2018 vs FY 2016
Construction $13,000,000	**Construction $0**	**Construction -$13,000,000**
• Completed the first phase of funding for the replacement of the PECOS system, including associated infrastructure, at the NNSS DAF with Argus. The second phase—an additional $13,000,000—was funded in FY 2017.	• Project construction underway.	• Project construction underway.

Defense Nuclear Security
Performance Measures

In accordance with the GPRA Modernization Act of 2010, the Department sets targets for, and tracks progress toward, achieving performance goals for each program.

	FY 2016	FY 2017	FY 2018
Performance Goal (Measure)	**Enterprise Risk Management (ERM) -** Implement and sustain a repeatable process for conducting site vulnerability and risk assessments and a set of consistent deliverables to help Federal oversight ensure the security program is integrated, robust, and efficient.		
Target	90 % index	90 % index	95 % index
Result	Met - 90	TBD	TBD
Endpoint Target	By 2017, achieve an improved corporate understanding of site operations, protection strategies, and risk acceptance that enables decision-makers to make true cost/benefit and risk acceptance decisions for physical security, better risk-informed resource allocation decisions, and more balance across NNSA sites, maintaining a 95% index thereafter.		
Performance Goal (Measure)	**Physical Security Infrastructure Recapitalization (PSIR) -** Implement and maintain a physical security life cycle management process, including on-time and to-standard supplemental deliverables after implementation.		
Target	90 % index	90 % index	95 % index
Result	Met - 90	TBD	TBD
Endpoint Target	By 2017, achieve defensible prioritization of systems investments based on risk, more efficient bulk procurements, more common systems configurations/designs, timely redistribution of inventories based on site needs, and more accurate reporting to external stakeholders on condition of NNSA security systems, maintaining a 95% index thereafter.		
Performance Goal (Measure)	**Protective Force Training Reform -** Implement and sustain an Enterprise Mission Essential Task List (EMETL)-based training program for protective forces at all eight NNSA sites.		
Target	90 % index	90 % index	95 % index
Result	Met - 90	TBD	TBD
Endpoint Target	By FY 2017, produce protective forces that are high-performing in mission accomplishment with a necessary/appropriate training program that minimizes unproductive training time, maintaining a 95% index thereafter.		

Defense Nuclear Security
Capital Summary

(Dollars in Thousands)

	Total	Prior Years	FY 2016 Enacted	FY 2016 Current	FY 2017 Annualized CR*	FY 2018 Request	FY 2018 vs FY 2016
Capital Operating Expenses Summary (including Major Items of Equipment (MIE)							
Capital Equipment >$500K (including MIE)	0	N/A	0	0	0	0	0
Plant Projects (GPP and IGPP)	25,150	N/A	25,150	25,150	0	0	-25,150
Total, Capital Operating Expenses	**25,150**	**N/A**	**25,150**	**25,150**	**0**	**0**	**-25,150**
Capital Equipment > $500K (including MIE)							
Total Non-MIE Capital Equipment	0	N/A	0	0	0	0	0
Total, Capital Equipment (including MIE)	**0**	**N/A**	**0**	**0**	**0**	**0**	**0**
Plant Projects (GPP and IGPP)							
Total Plant Projects (GPP/IGPP) (Total Estimated Cost (TEC) <$5M)	0	N/A	0	0	0	0	0
Sensor Replacement Phase 1, Y-12	6,195	N/A	6,195	6,195	0	0	-6,195
Sensor Replacement Phase 2, Y-12	5,910	N/A	5,910	5,910	0	0	-5,910
Sensor Replacement Phase 3, Y-12	5,515	N/A	5,515	5,515	0	0	-5,515
Sensor Replacement Phase 4, Y-12	7,530	N/A	7,530	7,530	0	0	-7,530
Total, Plant Projects (GPP/IGPP)	**25,150**	**N/A**	**25,150**	**25,150**	**0**	**0**	**-25,150**
Total, Capital Summary	**25,150**	**N/A**	**25,150**	**25,150**	**0**	**0**	**-25,150**

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Defense Nuclear Security
Construction Projects Summary

(Dollars in Thousands)

	Total	Prior Years	FY 2016 Enacted	FY 2017 Enacted	FY 2018 Request	FY 2018 vs FY 2017
14-D-710, Device Assembly Facility (DAF) Argus Installation, NNSS, Las Vegas, NV						
Total Estimated Cost (TEC)	29,633	3,633	13,000	13,000	0	-13,000
Other Project Cost (OPC)	5,967	3,067	500	300	1,050	+750
TPC, 14-D-710, DAF/Argus, NNSS	**35,600**	**6,700**	**13,500**	**13,300**	**1,050**	**-12,250**
Total All Constructon Projects						
Total Estimated Cost (TEC)	29,633	3,633	13,000	13,000	0	-13,000
Other Project Cost (OPC)	5,967	3,067	500	300	1,050	+750
Total Project Cost (TPC) All Construction Projects	**35,600**	**6,700**	**13,500**	**13,300**	**1,050**	**-12,250**

Outyears to Completion for Defense Nuclear Security

	(Dollars in Thousands)			
	FY 2019 Request	**FY 2020 Request**	**FY 2021 Request**	**FY 2022 Request**
14-D-710, Device Assembly Facility (DAF) Argus Installation, NNSS, Las Vegas, NV				
Total Estimated Cost (TEC)	0	0	0	0
Other Project Cost (OPC)	750	0	0	0
Total, 14-D-710, Device Assembly Facility (DAF) Argus Installation, NNSS, Las Vegas, NV	**750**	**0**	**0**	**0**
Total All Construction Projects				
Total Estimated Cost (TEC)	0	0	0	0
Other Project Cost (OPC)	750	0	0	0
Total Project Cost (TPC) All Construction Projects	**750**	**0**	**0**	**0**

Defense Nuclear Security
Other Information

Full Cost Recovery Estimates

	(Dollars in Thousands)			
	FY 2016 Current	FY 2017 Annualized CR*	FY 2018 Request	FY 2018 vs FY 2016
Site				
Kansas City National Security Complex	594	450	687	+93
Lawrence Livermore National Laboratory	13,604	9,400	9,200	- 4,404
Los Alamos National Laboratory	3,824	4,700	5,445	+1,621
Nevada National Security Site	0	0	1,100	+1,100
NNSA Production Office	2,693	1,500	2,433	- 260
Sandia National Laboratories	15,386	17,500	23,100	+7,714
Total	**36,101**	**33,550**	**41,965**	**+5,864**

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The FY 2018 Budget Request provides direct funding for mission-based program for DNS. Strategic Partnership Projects will continue to fund an allocable share of the base program through full cost recovery. Extraordinary security requirements, such as dedicated security for special projects or exercises, on an extended basis, for Strategic Partnership projects will be a direct charge to those customers.

Information Technology and Cybersecurity

Overview

The Information Technology and Cybersecurity Program is responsible for Information Sharing and Information Safeguarding to support the mission of NNSA. The office supports Information Technology (IT) and Cybersecurity solutions, including continuous monitoring, cloud-based technologies, and enterprise security technologies (i.e., identity, credential, and access management) to help meet security challenges. This program is ground firmly in practical principals that will continue to provide superior information management support to current operations while implementing unclassified and classified cloud-based technologies to support the nuclear security enterprise. To provide for the protection of NNSA information and information assets, the program collaborates and coordinates with the DOE Office of the Chief Information Officer (OCIO) on the development and implementation of cybersecurity and information technology solutions. The requested funds for the Information Technology and Cybersecurity Program operate cyber infrastructure at NNSA sites, implement requirements for classified computing environment directed by the Committee on National Security Systems (CNSS), and execute Public Key Infrastructure (PKI) capabilities for authentication to unclassified and classified networks and applications.

The NNSA Information Technology and Cybersecurity Program focuses on the development of integrated IT initiatives that provide an effective technology infrastructure and support to the nuclear security enterprise shared services. These initiatives will fundamentally redesign the NNSA IT environments to provide a secure set of capabilities including unified communication, federated identity services, agile cloud infrastructure, and next-generation collaboration services across the nuclear security enterprise including headquarters, laboratories, and plants. The approach will provide commodity services that can be used in the future with NNSA Management and Operating (M&O) partners to improve security of sensitive unclassified and classified NNSA data, lower IT costs, and host shared services. In addition, the strategy will provide a dramatic step forward in collaboration capabilities by delivering a federated, unclassified, unified communications capability and the deployment of a secure, agency wide network.

The Information Technology and Cybersecurity Program sets forth goals and objectives to guide the execution of the NNSA Information Management Program in support of the NNSA mission and objectives. By achieving these goals and objectives, NNSA improves protection of information and information assets; counters new and evolving threats; educates and aids its workforce; and supports the development of mission-oriented requirements that effectively integrate security into everyday operations.

Achieving and maintaining a secure NNSA information environment for the enterprise requires an approach that combines defense-in-depth and defense-in-breadth principles with essential guiding tenets that align the Information Technology and Cybersecurity Program with NNSA cultural and business drivers. The underlying set of four guiding tenets of risk management, agility, trust, and partnership align with the people, processes, and technology elements to support the defense-in-depth values of achieving mission effectiveness and are integral to the success of the Information Technology and Cybersecurity Program.

While facing the current challenges, the NNSA Information Technology and Cybersecurity Program will continue focusing on improving both the performance of its staff and the security of the IT environment across the nuclear security enterprise. The program will also continue maintaining and modernizing the aging IT and Cybersecurity infrastructure that supports mission activities within the weapons program classified information processing environment, nuclear material transport, weapon modernization, and incident response. The NNSA Information Technology and Cybersecurity Program will continue evaluating risk and allocating resources to reduce threats in order to support the mission of the NNSA.

Highlights of the FY 2018 Budget Request

In FY 2018, the Information Technology and Cybersecurity Program plans to:

- Continue modernization of the Enterprise Secure Network (ESN) by enhancing the core services and collaborative capabilities and consolidating disparate networks.

- Modernize the Cybersecurity infrastructure, comprised of almost 100 sensors and over 70 data acquisition servers dispersed nationwide for the NNSA's Information Assurance Response Center (IARC). The IARC is responsible for providing 24/7/365 Cybersecurity services to 66 current and any future NNSA and DOE networking enclaves. The IARC's services and service levels meet strict Federal requirements that permit sites to maintain mission-essential access to the Federal classified networks, SIPRNET and ESN. The IARC also provides near-real-time network defense and incident response services that protect these classified and unclassified enclaves and information from attacks. As a participant with the JC3 Program, the IARC also supports enterprise-level cyber threat management and situational awareness for the Department.
- Implement the NNSA Application Modernization Strategy, which seeks to minimize the number of disparate NNSA federal business and mission support IT applications in favor of a platform-based approach. This facilitates reduced hardware, software, and labor costs via rapid application development, single sign-on, and maximum re-use of hardware infrastructure, software licenses, custom code, logic/workflows, data objects; it is an organized effort to cultivate enterprise-wide adoption of shared infrastructure capabilities by the NNSA federal and M&O communities.
- Continue to mature the Continuous Monitoring capabilities across the nuclear security enterprise providing strong Cybersecurity situational awareness to NNSA senior leadership.
- Implement a Telecommunications Security Program within NNSA to deliver more effective oversite greatly reducing negative impacts to the mission programs while increasing visibility, oversite of risks, and governance of this critical function.

Information Technology and Cybersecurity
Funding

	(Dollars in Thousands)			
	FY 2016 Enacted	**FY 2017 Annualized CR***	**FY 2018 Request**	**FY 2018 vs FY 2016**
Information Technology and Cybersecurity				
Cybersecurity				
Infrastructure Program	108,188	120,688	122,828	+14,640
Technology Application Development	6,000	6,000	4,000	-2,000
Total, Cybersecurity	**114,188**	**126,688**	**126,828**	**+12,640**
Enterprise Secure Computing	18,400	18,400	23,400	+5,000
Federal Unclassified Information Technology	25,000	25,000	36,500	+11,500
Total, Information Technology and Cybersecurity	**157,588**	**170,088**	**186,728**	**+29,140**

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Information Technology and Cybersecurity
Explanation of Major Changes
(Dollars in Thousands)

	FY 2018 vs FY 2016
Information Technology and Cybersecurity	
Cybersecurity: The increase represents the required budget to operate the Cybersecurity Infrastructure program for FY 2018, which supports baseline cybersecurity operations and activities at NNSA M&O and Federal sites. It also enables the mission support contractor to provide Multi-Factor Authentication related policy and governance oversight support and includes the necessary funding to support the implementation of Continuous Diagnostics and Mitigation and provide enhanced telecommunication services for the nuclear security enterprise and infrastructure.	+12,640
Enterprise Secure Computing: The increase continues the modernization of the ESN by enhancing the core services, collaborative capabilities, and cyber security; consolidating disparate networks; deploying and operating the PKI capabilities for authentication to secret networks and applications, and fully utilizing the Energy Sciences Network (ESNet) to provide a high performance-networking environment.	+5,000
Federal Unclassified Information Technology: The increase assists maintaining the existing unclassified commodities (such as: desktop computers, application hosting, printers, and mobile devices) and mission information technology capabilities; initiates the modernization of current applications; provides support and updates for the federal field IT workforce environment; and allows mission support contractor to provide Federal Information Technology Acquisition Reform Act (FITARA) related policy and governance oversight support.	+11,500
Total, Information Technology and Cybersecurity	**+29,140**

Information Technology and Cybersecurity
Cybersecurity

Description

The highly complex and global nature of the NNSA mission environment makes it critically important that information and information assets are managed and protected using an effective risk management approach. Well-informed management decisions require a systematic understanding of the risks inherent in the use of information systems. The entirety of information collected, created, processed, transmitted, stored, or disseminated by, or on behalf of, the NNSA on automated information systems requires a level of protection commensurate with the risk to the information and the associated information processing systems. The information systems facilitating these activities must also be protected.

The infrastructure program supports the cybersecurity operations and activities at NNSA M&O and federal sites. The cybersecurity operations and infrastructure program is built around a defense-in-depth approach for achieving cybersecurity in a highly networked environment. The defense-in-depth approach is a combination of known best practices and cost strategy that relies on the intelligent application of techniques and technologies that exist today to address the increasing number and complexity of cybersecurity threats, vulnerabilities, and risks.

Technology Application Development is responsible for developing and advancing policies and initiatives that support short and long-term solutions to specific cybersecurity needs at NNSA sites and headquarters locations and focuses on emerging technologies and leveraging existing technology resources to create a more secure environment.

Cybersecurity

Activities and Explanation of Changes

FY 2016 Enacted	FY 2018 Request	Explanation of Changes FY 2018 vs FY 2016
Cybersecurity $114,188,000	**Cybersecurity $126,828,000**	**Cybersecurity +$12,640,000**
Infrastructure Program $108,188,000	**Infrastructure Program $122,828,000**	**Infrastructure Program +$14,640,000**
• Continued to fund the Cybersecurity programs at each of the national security laboratories, plants, and sites to defend appropriately against the steadily increasing threats. • Implemented Initial Operating Capability (IOC) of Telecommunications Security Program within NNSA.	• Funds customary modernization of the Cybersecurity programs at the national security laboratories, plants, and sites to defend against increasingly adaptive threats. • Establishes automated visibility into connected endpoint systems by way of host based intrusion solutions.	• Increase funds procurements of core enterprise toolsets to enforce the standardization of defensive strategies and cyber response. • Supports further integration and collaboration across the enterprise cyber communities in the areas of operations, response, strategy, design, and monitoring.
Technology Application Development $6,000,000	**Technology Application Development $4,000,000**	**Technology Application Development -$2,000,000**
• Supported research and development on enhanced secure protocol standards specifically designed for Restricted Data in transmission and at rest. • Supported implementation of NNSA OCIO Centers of Excellence for Enterprise Efficiencies improvements across Cyber enterprise.	• Supports research and development on enhanced secure protocol standards specifically designed for Restricted Data in transmission and at rest.	• Decrease reflects funding received in FYs 2016 and 2017 to support implementation of a comprehensive research and development initiative for Cybersecurity, which allowed for an investment into the NNSA's Centers of Excellence program at SNL.

Information Technology and Cybersecurity
Enterprise Secure Computing

Description

Enterprise Secure Computing (ESC) provides state-of-the-art enterprise level classified computing infrastructure that supports effective collaboration and information sharing necessary for the NNSA enterprise. It has two components:

- The NNSA Secret Network (NSN) supports the processing of Secret/National Security Information (NSI) and the interconnection with DOD SIPRNET.
- The ESN operates at the Secret/Restricted Data level and consists of independent site installations of standardized equipment and commercial off-the-shelf software integrated through a common infrastructure and shared policies and procedures.

NSN/ESN features an enterprise-level identity model, strong (two-factor) authentication, and a centralized monitoring and analysis capability. The program provides the necessary secure infrastructure and cybersecurity systems required to meet the informational needs of the science-based stockpile stewardship program with a modeling and simulation-based science and engineering environment. ESN and NSN both provide a broad base of security and network services that include application integration, authentication services, directory services, enterprise data resource management, IARC Security Operations Center and Network Operations Center, Identity and Access Management, PKI, and security monitoring /intrusion detection.

NSN/ESN is the classified environment with which each of the DOE/NNSA laboratories and sites communicate and share information regarding NNSA's primary mission. ESC continually looks to improve the infrastructure of the network in order to enhance services to the enterprise. An example of this is the ongoing project to complete the implementation of PKI smart cards on the NSN and begin deployment of PKI smart cards on the ESN. Both efforts will result in the issuance of tokens and enabling network login to the DOE Secret Fabric users to satisfy Steering Committee IOC/FOC goals and reduce anonymity. Another example is NSN/ESN executing the initial deployment of a modern cross-domain solution to replace one of the legacy gateways currently in production during FY 2018. Digital Rights Management (DRM)/Data Loss Protection (DLP) Technology begins initial deployment during FY 2018 along with enhanced cyber monitoring capabilities.

ESN also serves as the base network for the classified commodity services, which entails a next-generation approach to classified collaborative computing using the above-mentioned secure virtual desktop infrastructure (VDI) to facilitate disparate DOE/NNSA entities to share information. Redundant or complementary networks are consistently evaluated for possible consolidation with support from the respective program offices. This ongoing network consolidation effort will continue to provide the NNSA Information Technology and Cybersecurity Program the ability to more effectively manage the information security posture for the agency and maximize investment allocation across multiple program areas. In addition to consolidation, secure cloud services are more available and reliable across the enterprise. Additional services provided on the ESC include initial deployment of an enterprise-classified marking and electronic records system in FY 2018.

The NSN/ESN is currently deployed at NNSA and multiple DOE sites, other departments and organizations, and select allied nations. Additional sites are continually being added to the network.

Enterprise Secure Computing

Activities and Explanation of Changes

FY 2016 Enacted	FY 2018 Request	Explanation of Changes FY 2018 vs FY 2016
Enterprise Secure Computing $18,400,000	**Enterprise Secure Computing $23,400,000**	**Enterprise Secure Computing +$5,000,000**
• Continued upgrades and enhancements for classified applications and services to improve collaboration and information sharing. • Enhanced cross-domain capability. • Continued transition of participating sites to enterprise VDI. • Continued expansion of NSI infrastructure to provision commodity services. • Completed two-factor authentication PKI for Secret/Restricted Data infrastructure and provided ongoing operations and maintenance of the PKI infrastructure on the Secret/Restricted Data infrastructure. • Continued consolidating services and disparate networks within a cloud structure. • Continued enhancing system availability and reliability in the infrastructure and provide additional security measures. • Operated and maintained Secret/Restricted Data infrastructure, including the utilization of the ESNet infrastructure for the network transport layer.	• Continue to upgrade and enhance classified applications and services to improve collaboration and information sharing. • Replace a legacy gateway with a modern cross-domain capability. • Complete the two-factor authentication PKI for Secret/Restricted Data infrastructure and provide ongoing operations and maintenance of the PKI infrastructure on the Secret/Restricted Data infrastructure. • Continue enhancements for system availability and reliability in the infrastructure and provide additional security measures. • Operate and maintain Secret/Restricted Data infrastructure, including the utilization of the ESNet infrastructure for the network transport layer.	• Reflects an increase of $5,300,000 to continue support for the ESNet/PKI Infrastructure partially offset by a decrease of $300,000 for Infrastructure Recapitalization of the ESN.

Information Technology and Cybersecurity
Federal Unclassified Information Technology

Description

Federal Unclassified Information Technology provides corporate-type services in the areas of business, technology, finance, legal, and management to the field offices, the Albuquerque Complex, and NNSA Headquarters upon request in order to support the NNSA mission. Services include but are not limited to: design, development, and maintenance of NNSA field computing activities; voice and data resources for effective communications among NNSA Field Offices, M&O contractors, and NNSA Headquarters; information assurance and cyber security; records management support; coordination, review, and publication of NNSA directives; and printing, reproduction, and forms management services.

Federal Unclassified Information Technology provides commodity-based computing infrastructure, which seeks to facilitate effective collaboration and information sharing necessary for NNSA federal employees and support contractors to execute the NNSA mission. Through regular communication with DOE/NNSA leadership, DOE IT organizations, contract partners in the labs and field, and associates across the federal IT community, NNSA has identified an opportunity to push modernization efforts to implement a true service broker model that will leverage managed services. Building on past organizational successes to modernize and strengthen an aging infrastructure, the NNSA OCIO will push forward to find new and innovative ways to consume, leverage, share, and safeguard information. Our focus on a managed service model will not only enable NNSA to take advantage of new and emerging technologies while maximizing budget and resources. The model also presents many opportunities to participate in economies of scale and rely on industry's rapid development and testing practices to ensure NNSA is using secure, modern technology. In order to think, behave, and respond as one cohesive agency with a shared, critical national security mission, it is necessary to re-engineer the telecommunications networks and continuously improve service offerings to remove technical barriers to collaboration and outfit employees with effective communication tools to maximize efficiency and lower operational costs.

Federal Unclassified Information Technology

Activities and Explanation of Changes

FY 2016 Enacted	FY 2018 Request	Explanation of Changes FY 2018 vs FY 2016
Federal Unclassified Information Technology $25,000,000	**Federal Unclassified Information Technology $36,500,000**	**Federal Unclassified Information Technology +$11,500,000**
• Continued deployment support of information technology enhancement that facilitates effective collaboration and information sharing necessary for NNSA federal employees and support contractors to carry out the NNSA's mission. • Coordinated and oversaw delivery of federal desktop and video teleconferencing services. • Continued providing IT technical services, incidental advisory, and assistance services. • Continued oversight and implementation of hardware and software licensing, maintenance, and refresh. • Continued funding NNSA field offices IT services provisioned by M&O partners. • Continued work with NNSA M&O partners to implement and operate a shared services model. • Oversaw the M&O partners' unclassified IT programs. • Continued implementation of the application modernization project.	• Continue to support the deployment of information technology enhancements that facilitate effective collaboration and information sharing necessary for NNSA federal employees and support contractors to carry out the NNSA's mission. • Coordinate and oversee the delivery of federal desktop and video teleconferencing services. • Continue to provide IT technical services, incidental advisory, and assistance services. • Continue to oversee the implementation of hardware and software licensing, maintenance, and refresh. • Continue to provide funding for NNSA field office IT services provisioned by M&O partners. • Continue to work with the NNSA M&O partners to implement and operate a shared services model. • Continue to provide oversight of the M&O partners' unclassified IT programs. • Continue implementation of the application modernization project. • Begin implementation of Enterprise VoIP as a service. • Provide oversight of activities related to, and ensure agency compliance with, the provisions of FITARA.	• Increases oversight of activities related to, and ensure agency compliance with, the provisions of FITARA ($1,500,000). • Funding from FSE account to execute and support NNSA field office IT expenses ($2,000,000). • Increases operational baseline of the Federal Unclassified Information Technology environment to account for increases in IT Other Direct Costs, field IT refresh requirements, and commodity service expenses across the enterprise ($3,000,000). • Provides capability to invest in application modernization and provide IT infrastructure enhancements and upgrades ($5,000,000).

Information Technology and Cybersecurity
Performance Measures

In accordance with the GPRA Modernization Act of 2010, the Department sets targets for, and tracks progress toward, achieving performance goals for each program.

	FY 2016	FY 2017	FY 2018
Performance Goal (Measure)	**Cybersecurity Assessment Reviews -** Annual Percentage of cybersecurity Site Assessment Reviews conducted by the Office of Environment, Health, Safety, and Security (HSS) that resulted in the rating of "effective."		
Target	100 % of reviews resulting in "effective" rating	100 % of reviews resulting in "effective" rating	100 % of reviews resulting in "effective" rating
Result	Not Met - 66.67	TBD	TBD
Endpoint Target	Annually, achieve at least an "effective" rating of 100% of OCIO Site Assistance Visit (SAV) Cybersecurity reviews.		

Information Technology and Cybersecurity
Other Information

Full Cost Recovery Estimates

(Dollars in Thousands)

	FY 2016 Enacted	FY 2017 Annualized CR*	FY 2018 Request	FY 2018 vs FY 2016
Site				
Kansas City National Security Campus	400	400	400	0
Lawrence Livermore National Laboratory	2,200	3,200	3,200	+1,000
Los Alamos National Laboratory	1,400	1,400	1,400	0
Nevada National Security Site	600	600	600	0
Pantex Plant	80	80	80	0
Sandia National Laboratories	8,000	8,000	8,000	0
Total	**12,680**	**13,680**	**13,680**	**+1,000**

* The FY 2017 Annualized CR amounts reflect the P.L. 114-254 continuing resolution level annualized to a full year. These amounts are shown only at the congressional control level and above, below that level, a dash (-) is shown.

The FY 2018 Budget Request provides direct funding for mission-driven activities focused on research and development of IT and cybersecurity solutions. Because some support is provided to other programs for materials and services provided to agencies outside the Department, these costs will be allocated to the SPP customers as work is accomplished at the contractor site. The table above provides an estimate of costs that will be recovered from SPP customers.

Department Of Energy

FY 2018 Congressional Budget

Funding By Appropriation By Site

($K)

Weapons Activities	**FY 2016 Enacted**	**FY 2017 Annualized CR**	**FY 2018 Request**
Argonne National Laboratory			
Science			
Science Campaign	0	300	300
Advanced Simulation & Computing			
Advanced Simulation & Computing Campaign	500	500	0
Infrastructure and Operations			
Infrastructure and Operations	10	50	0
Total, Argonne National Laboratory	**510**	**850**	**300**
Bechtel Marine Propulsion Center			
Infrastructure and Operations			
Infrastructure and Operations	1,450	432	330
Total, Bechtel Marine Propulsion Center	**1,450**	**432**	**330**
Brookhaven National Laboratory			
Infrastructure and Operations			
Infrastructure and Operations	200	216	275
Total, Brookhaven National Laboratory	**200**	**216**	**275**
Chicago Operations Office			
Advanced Simulation & Computing			
Advanced Simulation & Computing Campaign	290	1,500	0
Total, Chicago Operations Office	**290**	**1,500**	**0**
Consolidated Business Center			
Infrastructure and Operations			
Infrastructure and Operations	470	530	530
Total, Consolidated Business Center	**470**	**530**	**530**
General Atomics Site			
Inertial Confinement Fusion Ignition High Yield			
Inertial Confinement Fusion Ignition High Yield Campaign	24,000	24,420	24,125
Total, General Atomics Site	**24,000**	**24,420**	**24,125**
Idaho National Laboratory			
Directed Stockpile Work			
Directed Stockpile Work	5,285	3,756	2,793
Infrastructure and Operations			
Infrastructure and Operations	745	820	0
Nuclear Counterterrorism Incident Response			
Nuclear Counterterrorism Incident Response	0	0	0
Total, Idaho National Laboratory	**6,030**	**4,576**	**2,793**

Department Of Energy

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Funding By Appropriation By Site

($K)

Weapons Activities	FY 2016 Enacted	FY 2017 Annualized CR	FY 2018 Request
Kansas City National Security Complex (KCNSC)			
Directed Stockpile Work			
Directed Stockpile Work	331,385	333,798	447,144
Engineering			
Engineering Campaign	3,102	3,100	4,135
Advanced Simulation & Computing			
Advanced Simulation & Computing Campaign	500	500	0
Defense Nuclear Security			
Defense Nuclear Security	11,423	11,527	11,884
Readiness Campaign			
Readiness Campaign	0	0	0
Information technology and Cybersecurity			
Information technology and Cybersecurity	5,576	5,576	5,576
Secure Transportation Asset			
Secure Transportation Asset	17,700	20,882	17,418
Advanced Manufacturing Development			
Advanced Manufacturing Development	46,344	9,092	17,702
Total, Kansas City National Security Complex (KCNSC)	**416,030**	**384,475**	**503,859**
Kansas City Site Office			
Infrastructure and Operations			
Infrastructure and Operations	179,655	132,484	137,427
Total, Kansas City Site Office	**179,655**	**132,484**	**137,427**
Lawrence Berkeley National Laboratory			
Advanced Simulation & Computing			
Advanced Simulation & Computing Campaign	5,000	0	0
Total, Lawrence Berkeley National Laboratory	**5,000**	**0**	**0**

Department Of Energy

FY 2018 Congressional Budget

Funding By Appropriation By Site

($K)

Weapons Activities	**FY 2016 Enacted**	**FY 2017 Annualized CR**	**FY 2018 Request**
Lawrence Livermore National Laboratory			
Directed Stockpile Work			
Directed Stockpile Work	202,052	215,584	284,170
Science			
Science Campaign	118,657	118,850	131,034
Engineering			
Engineering Campaign	19,355	17,695	35,720
Inertial Confinement Fusion Ignition High Yield			
Inertial Confinement Fusion Ignition High Yield Campaign	326,591	325,876	326,159
Advanced Simulation & Computing			
Advanced Simulation & Computing Campaign	216,676	180,166	176,735
Defense Nuclear Security			
Defense Nuclear Security	51,538	53,583	53,620
Information technology and Cybersecurity			
Information technology and Cybersecurity	13,125	16,415	16,415
Infrastructure and Operations			
Infrastructure and Operations	135,746	154,265	197,923
Nuclear Counterterrorism Incident Response			
Nuclear Counterterrorism Incident Response	0	0	0
Advanced Manufacturing Development			
Advanced Manufacturing Development	10,800	12,600	8,671
Total, Lawrence Livermore National Laboratory	**1,094,540**	**1,095,034**	**1,230,447**
Los Alamos National Laboratory			
Directed Stockpile Work			
Directed Stockpile Work	611,735	604,808	668,448
Science			
Science Campaign	138,348	141,522	161,430
Engineering			
Engineering Campaign	25,768	22,715	39,812
Inertial Confinement Fusion Ignition High Yield			
Inertial Confinement Fusion Ignition High Yield Campaign	16,000	17,080	18,523
Advanced Simulation & Computing			
Advanced Simulation & Computing Campaign	219,556	183,469	177,071
Defense Nuclear Security			
Defense Nuclear Security	99,951	99,951	103,989
Information technology and Cybersecurity			
Information technology and Cybersecurity	15,227	15,426	15,426
Infrastructure and Operations			
Infrastructure and Operations	557,700	520,996	538,490
Advanced Manufacturing Development			
Advanced Manufacturing Development	11,400	8,794	5,076
Total, Los Alamos National Laboratory	**1,695,685**	**1,614,761**	**1,728,265**

Department Of Energy

FY 2018 Congressional Budget

Funding By Appropriation By Site

($K)

Weapons Activities	**FY 2016 Enacted**	**FY 2017 Annualized CR**	**FY 2018 Request**
National Energy Technology Lab			
Directed Stockpile Work			
Directed Stockpile Work	8,101	19,173	14,996
Engineering			
Engineering Campaign	420	600	1,040
Advanced Simulation & Computing			
Advanced Simulation & Computing Campaign	136	108	0
Readiness Campaign			
Readiness Campaign	0	0	0
Infrastructure and Operations			
Infrastructure and Operations	0	230	0
Advanced Manufacturing Development			
Advanced Manufacturing Development	1,200	916	1,600
Total, National Energy Technology Lab	**9,857**	**21,027**	**17,636**
Naval Research Laboratory			
Science			
Science Campaign	0	4,000	4,000
Inertial Confinement Fusion Ignition High Yield			
Inertial Confinement Fusion Ignition High Yield Campaign	6,450	7,210	7,400
Infrastructure and Operations			
Infrastructure and Operations	0	960	670
Total, Naval Research Laboratory	**6,450**	**12,170**	**12,070**
Nevada Field Office			
Directed Stockpile Work			
Directed Stockpile Work	1,100	2,232	0
Defense Nuclear Security			
Defense Nuclear Security	68,244	71,634	73,498
Information technology and Cybersecurity			
Information technology and Cybersecurity	4,000	4,020	4,020
Total, Nevada Field Office	**73,344**	**77,886**	**77,518**

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Funding By Appropriation By Site
($K)

Weapons Activities	FY 2016 Enacted	FY 2017 Annualized CR	FY 2018 Request
Nevada National Security Site			
Directed Stockpile Work			
Directed Stockpile Work	47,885	42,237	49,376
Science			
Science Campaign	52,569	45,157	59,347
Defense Nuclear Security			
Defense Nuclear Security	13,000	13,000	0
Infrastructure and Operations			
Infrastructure and Operations	152,668	163,749	180,250
Secure Transportation Asset			
Secure Transportation Asset	207	331	20
Total, Nevada National Security Site	**266,329**	**264,474**	**288,993**
NNSA Albuquerque Complex			
Directed Stockpile Work			
Directed Stockpile Work	234,609	117,384	276,313
Science			
Science Campaign	57,259	34,891	36,171
Engineering			
Engineering Campaign	6,889	18,673	20,462
Inertial Confinement Fusion Ignition High Yield			
Inertial Confinement Fusion Ignition High Yield Campaign	20,429	20,741	22,397
Advanced Simulation & Computing			
Advanced Simulation & Computing Campaign	27,612	21,129	0
Defense Nuclear Security			
Defense Nuclear Security	7,240	7,385	7,532
Infrastructure and Operations			
Infrastructure and Operations	13,120	22,690	100,196
Secure Transportation Asset			
Secure Transportation Asset	183,438	87,993	125,487
Advanced Manufacturing Development			
Advanced Manufacturing Development	6,781	753	773
Total, NNSA Albuquerque Complex	**557,377**	**331,639**	**589,331**
NNSA Production Office (NPO)			
Directed Stockpile Work			
Directed Stockpile Work	0	0	3,500
Total, NNSA Production Office (NPO)	**0**	**0**	**3,500**
NNSA Production Site Office			
Directed Stockpile Work			
Directed Stockpile Work	1,000	0	4,000
Total, NNSA Production Site Office	**1,000**	**0**	**4,000**

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Funding By Appropriation By Site
($K)

Weapons Activities	FY 2016 Enacted	FY 2017 Annualized CR	FY 2018 Request
Oak Ridge Institute for Science & Education			
Science			
Science Campaign	237	200	200
Inertial Confinement Fusion Ignition High Yield			
Inertial Confinement Fusion Ignition High Yield Campaign	60	60	0
Total, Oak Ridge Institute for Science & Education	**297**	**260**	**200**
Oak Ridge National Laboratory			
Directed Stockpile Work			
Directed Stockpile Work	32,083	39,451	43,680
Advanced Simulation & Computing			
Advanced Simulation & Computing Campaign	25	105	0
Infrastructure and Operations			
Infrastructure and Operations	4,240	5,125	4,394
Total, Oak Ridge National Laboratory	**36,348**	**44,681**	**48,074**
Oak Ridge Office			
Domestic Uranium Enrichment RD&D			
Domestic Uranium Enrichment RD&D	0	0	0
Total, Oak Ridge Office	**0**	**0**	**0**
Office of Scientific & Technical Information			
Science			
Science Campaign	200	220	20
Information technology and Cybersecurity			
Information technology and Cybersecurity	213	213	213
Total, Office of Scientific & Technical Information	**413**	**433**	**233**
Pacific Northwest National Laboratory			
Directed Stockpile Work			
Directed Stockpile Work	23,082	30,815	32,779
Science			
Science Campaign	470	0	0
Engineering			
Engineering Campaign	2,185	0	0
Readiness Campaign			
Readiness Campaign	0	0	0
Infrastructure and Operations			
Infrastructure and Operations	2,400	4,400	5,000
Total, Pacific Northwest National Laboratory	**28,137**	**35,215**	**37,779**

Department Of Energy

FY 2018 Congressional Budget

Funding By Appropriation By Site

($K)

Weapons Activities	FY 2016 Enacted	FY 2017 Annualized CR	FY 2018 Request
Pantex Plant			
Directed Stockpile Work			
Directed Stockpile Work	316,897	382,349	397,769
Engineering			
Engineering Campaign	1,891	1,891	2,212
Defense Nuclear Security			
Defense Nuclear Security	125,422	130,881	137,823
Information technology and Cybersecurity			
Information technology and Cybersecurity	6,821	6,917	6,917
Infrastructure and Operations			
Infrastructure and Operations	191,016	176,783	192,404
Secure Transportation Asset			
Secure Transportation Asset	8,184	6,841	8,416
Advanced Manufacturing Development			
Advanced Manufacturing Development	3,950	4,475	629
Total, Pantex Plant	**654,181**	**710,137**	**746,170**
Pantex Site Office			
Readiness Campaign			
Readiness Campaign	0	0	0
Total, Pantex Site Office	**0**	**0**	**0**

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FY 2018 Congressional Budget

Funding By Appropriation By Site

($K)

Weapons Activities	FY 2016 Enacted	FY 2017 Annualized CR	FY 2018 Request
Sandia National Laboratories			
Directed Stockpile Work			
Directed Stockpile Work	986,508	914,019	1,096,014
Science			
Science Campaign	40,402	39,501	47,871
Engineering			
Engineering Campaign	67,881	63,409	79,910
Inertial Confinement Fusion Ignition High Yield			
Inertial Confinement Fusion Ignition High Yield Campaign	44,390	48,125	57,478
Advanced Simulation & Computing			
Advanced Simulation & Computing Campaign	146,433	157,645	153,543
Defense Nuclear Security			
Defense Nuclear Security	64,817	64,967	67,436
Readiness Campaign			
Readiness Campaign	0	0	0
Information technology and Cybersecurity			
Information technology and Cybersecurity	16,653	15,371	15,371
Infrastructure and Operations			
Infrastructure and Operations	166,155	175,307	183,835
Secure Transportation Asset			
Secure Transportation Asset	27,587	41,793	68,138
Advanced Manufacturing Development			
Advanced Manufacturing Development	15,069	8,734	5,908
Total, Sandia National Laboratories	**1,575,895**	**1,528,871**	**1,775,504**
Savannah River Operations Office			
Directed Stockpile Work			
Directed Stockpile Work	54	1,361	0
Total, Savannah River Operations Office	**54**	**1,361**	**0**

Department Of Energy

FY 2018 Congressional Budget

Funding By Appropriation By Site

($K)

Weapons Activities	**FY 2016 Enacted**	**FY 2017 Annualized CR**	**FY 2018 Request**
Savannah River Site			
Directed Stockpile Work			
Directed Stockpile Work	110,407	98,377	126,584
Science			
Science Campaign	0	300	700
Engineering			
Engineering Campaign	1,542	1,542	1,706
Defense Nuclear Security			
Defense Nuclear Security	6,830	6,967	7,106
Information technology and Cybersecurity			
Information technology and Cybersecurity	4,000	5,568	5,568
Infrastructure and Operations			
Infrastructure and Operations	110,925	117,673	154,910
Advanced Manufacturing Development			
Advanced Manufacturing Development	8,200	7,631	5,081
Total, Savannah River Site	**241,904**	**238,058**	**301,655**
Savannah River Site Office			
Readiness Campaign			
Readiness Campaign	0	0	0
Total, Savannah River Site Office	**0**	**0**	**0**
SLAC National Accelerator Laboratory			
Science			
Science Campaign	0	90	90
Total, SLAC National Accelerator Laboratory	**0**	**90**	**90**
University of Rochester			
Inertial Confinement Fusion Ignition High Yield			
Inertial Confinement Fusion Ignition High Yield Campaign	64,264	62,800	66,852
Total, University of Rochester	**64,264**	**62,800**	**66,852**

Department Of Energy

FY 2018 Congressional Budget

Funding By Appropriation By Site

($K)

Weapons Activities	**FY 2016 Enacted**	**FY 2017 Annualized CR**	**FY 2018 Request**
Washington Headquarters			
Directed Stockpile Work			
Directed Stockpile Work	87,593	84,520	132,210
Science			
Science Campaign	14,917	42,828	46,358
Engineering			
Engineering Campaign	98	2,125	5,794
Inertial Confinement Fusion Ignition High Yield			
Inertial Confinement Fusion Ignition High Yield Campaign	8,866	9,873	10,000
Advanced Simulation & Computing			
Advanced Simulation & Computing Campaign	6,028	102,598	226,895
Defense Nuclear Security			
Defense Nuclear Security	64,048	35,075	45,016
Readiness Campaign			
Readiness Campaign	0	0	0
Legacy Contractor Pensions			
Legacy Contractor Pensions	283,887	248,492	232,050
Information technology and Cybersecurity			
Information technology and Cybersecurity	85,151	93,665	110,305
Infrastructure and Operations			
Infrastructure and Operations	99,535	111,539	145,048
Secure Transportation Asset			
Secure Transportation Asset	0	98,598	105,580
Nuclear Counterterrorism Incident Response			
Nuclear Counterterrorism Incident Response	0	0	0
Advanced Manufacturing Development			
Advanced Manufacturing Development	1,174	1,979	1,599
Total, Washington Headquarters	**651,297**	**831,292**	**1,060,855**
Y-12 National Security Complex			
Directed Stockpile Work			
Directed Stockpile Work	388,016	423,679	397,250
Engineering			
Engineering Campaign	2,246	2,246	2,332
Advanced Simulation & Computing			
Advanced Simulation & Computing Campaign	250	375	0
Information technology and Cybersecurity			
Information technology and Cybersecurity	6,822	6,917	6,917
Secure Transportation Asset			
Secure Transportation Asset	2	0	5
Total, Y-12 National Security Complex	**397,336**	**433,217**	**406,504**

Department Of Energy

FY 2018 Congressional Budget

Funding By Appropriation By Site

($K)

Weapons Activities	FY 2016 Enacted	FY 2017 Annualized CR	FY 2018 Request
Y-12 Site Office			
Defense Nuclear Security			
Defense Nuclear Security	170,378	166,542	179,073
Infrastructure and Operations			
Infrastructure and Operations	663,089	819,968	961,455
Advanced Manufacturing Development			
Advanced Manufacturing Development	25,138	32,731	33,501
Total, Y-12 Site Office	**858,605**	**1,019,241**	**1,174,029**
Total, Weapons Activities	**8,846,948**	**8,872,130**	**10,239,344**

Defense Nuclear Nonproliferation

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Defense Nuclear Nonproliferation
Proposed Appropriation Language

For Department of Energy expenses, including the purchase, construction, and acquisition of plant and capital equipment and other incidental expenses necessary for defense nuclear nonproliferation activities, in carrying out the purposes of the Department of Energy Organization Act (42 U.S.C. 7101 et seq.), including the acquisition or condemnation of any real property or any facility or for plant or facility acquisition, construction, or expansion, $1,842,310,000, to remain available until expended: Provided, That of the unobligated balances from prior year appropriations available under this heading, $49,000,000 is hereby permanently cancelled: Provided further, That no amounts may be cancelled from amounts that were previously designated by the Congress as an emergency requirement pursuant to a concurrent resolution on the budget or the Balanced Budget and Emergency Deficit Control Act of 1985.

Note.—A full-year 2017 appropriation for this account was not enacted at the time the budget was prepared; therefore, the budget assumes this account is operating under the Further Continuing Appropriations Act, 2017 (P.L. 114–254). The amounts included for 2017 reflect the annualized level provided by the continuing resolution.

Explanation of Change

The FY 2018 Budget Request for Defense Nuclear Nonproliferation (DNN) reflects a 7.6 percent reduction from FY 2016 Enacted levels. Lower funding is required in FY 2018 relative to FY 2016 due to NNSA's rescission of prior year available balances and lower pension costs to continue to support FY 2018 mission work.

Public Law Authorizations

- P.L. 106-65, National Nuclear Security Administration Act, as amended
- P.L. 114-328, National Defense Authorization Act for Fiscal Year 2017
- Consolidated Appropriations Act, 2017

Defense Nuclear Nonproliferation

	(Dollars in Thousands)			
	FY 2016 Enacted	FY 2017 Annualized CR*	FY 2018 Request	FY 2018 vs FY 2016
Defense Nuclear Nonproliferation	1,940,302	1,936,614	1,842,310	-97,992
Rescission of Prior Year Balances	0	0	-49,000	-49,000
Total, Defense Nuclear Nonproliferation	**1,940,302**	**1,936,614**	**1,793,310**	**-146,992**

* The FY 2017 Annualized CR amounts reflect the P.L. 114-254 continuing resolution level annualized to a full year. These amounts are shown only at the congressional control level and above, below that level, a dash (-) is shown

Overview

NNSA plays a central role in reducing global nuclear threats across the entire nuclear threat spectrum by preventing the acquisition of nuclear weapons or weapons-usable materials, countering efforts to acquire such weapons or materials, and responding to nuclear or radiological accidents and incidents domestically and abroad.

This appropriation funds the Defense Nuclear Nonproliferation (DNN) program, which works to prevent the unauthorized or illegal acquisition of nuclear weapons or weapons usable-material by states or terrorists, as well as the Nuclear Counterterrorism and Incident Response (NCTIR) program, which primarily supports efforts to counter and respond to nuclear threats. These two programs provide policy and technical leadership to prevent or limit the spread of materials, technology, and expertise related to weapons of mass destruction; develop technologies to detect the proliferation of weapons of mass destruction worldwide; secure or eliminate inventories of nuclear weapons-related materials and infrastructure; ensure a technically trained response to nuclear and radiological incidents worldwide; support the Department's enterprise-wide approach to emergency management; and reduce the danger that hostile nations or terrorist groups may acquire nuclear devices, radiological dispersal devices or weapons-usable material, nuclear and dual-use commodities and technology, or nuclear-related expertise that could be used to develop nuclear weapon capabilities.

These activities are carried out in the context of a dynamic global security environment, which is described in NNSA's annual report entitled *Prevent, Counter, and Respond—A Strategic Plan to Reduce Global Nuclear Threats.* This environment is characterized by the persistent vulnerability of nuclear and radiological materials (particularly in regions of conflict); pressure on arms control and nonproliferation regimes from a continued interest in nuclear weapons capabilities by state and non-state actors; the global expansion of nuclear power and possible spread of fuel cycle technology; increasing opportunities for illicit nuclear material trafficking and increasingly sophisticated procurement networks; and the rapid advance of technology (including cyber-related tools) that may shorten nuclear weapon development timelines and directly affect nuclear safeguards and security missions.

DNN plays a primary role in implementing U.S. nuclear threat reduction in this strategic framework and also contributes to interagency and international nuclear security efforts. In the United States, DNN works in partnership with other U.S. government agencies, most notably the Department of State, Department of Defense, Department of Homeland Security, and Nuclear Regulatory Commission. Internationally, DNN has a strong and long-established partnership with the International Atomic Energy Agency (IAEA) and has active bilateral and multilateral program coordination, through forums such as the Nuclear Security Summit, the Global Initiative to Combat Nuclear Terrorism, and the Global Partnership against the Spread of Weapons and Materials of Mass Destruction.

In carrying out nuclear threat reduction, DNN draws broadly on the scientific and technical expertise of the Department and its laboratories, as well as the capacity for international outreach, engagement and project management, implementation, and policy expertise. DNN also relies on competencies of other elements of NNSA and Department of Energy (DOE), particularly the Office of Nuclear Energy, Office of Environmental Management, and Office of Science.

The major elements of the appropriation account include the following:

Material Management and Minimization (M^3)

M^3 addresses the persistent threat posed by vulnerable weapons-usable nuclear materials. The primary objective of the program is to achieve permanent threat reduction by minimizing and, when possible, eliminating weapons-usable nuclear material around the world. The FY 2018 Budget Request funds the conversion or shut-down of research reactors and isotope production facilities that use high enriched uranium (HEU); the acceleration of the establishment of new, non-HEU-based Mo-99 production facilities in the United States through the Uranium Lease and Take Back (ULTB) program in support of the American Medical Isotopes Production Act of 2012; the removal and disposal of weapons-usable nuclear material; the development of the lifecycle cost estimate and schedule for the dilute and dispose alternative for plutonium disposition; and the increase in costs to down-blend HEU due to the decline in uranium market prices. In addition, as political and technical challenges have delayed implementation of several removal efforts, prior year uncosted balances will be used to offset costs to support the removal, consolidation, and disposal of excess nuclear material from civilian sites worldwide. NNSA currently supports ULTB actions with DNN funding, and DOE/NNSA has requested the establishment of a general revolving fund to complete the ULTB work in FY 2018.

Global Material Security (GMS)

GMS enhances nuclear security through nonproliferation by working with partner countries to increase the security of vulnerable nuclear and radiological materials and facilities and improve partner countries' abilities to deter, detect, and investigate illicit trafficking. These activities aim to prevent terrorists from acquiring radiological or nuclear material that could be used in an attack on the United States or its interests. The decrease reflects a commitment to reduce prior year carryover balances, permitting a lower FY 2018 Budget Request.

Nonproliferation and Arms Control (NPAC)

NPAC supports activities to prevent the proliferation or use of weapons of mass destruction (WMD) by state and non-state actors. NPAC develops and implements programs and strategies to strengthen international nuclear safeguards; control the spread of dual-use WMD material, equipment, technology, and expertise; verify nuclear reductions and compliance with nonproliferation and arms control treaties and agreements; and address enduring and emerging nonproliferation and arms control challenges and opportunities. The decrease of $500K, less than one percent of the budget, results from a return to baseline funding following a one-time increase of $3.5 million in FY 2016 for improvements in the 10 CFR Part 810 export control process. The $3.5 million decrease is offset by a $3.0 million increase to Nuclear Verification to enhance training and deployment readiness of the U.S. Uranium and Plutonium Verification Teams.

Defense Nuclear Nonproliferation Research and Development (DNN R&D)

DNN R&D drives the innovation of unilateral and multi-lateral technical capabilities to detect nuclear detonations; foreign nuclear weapons programs' activities; and the presence, movement, or diversion of special nuclear materials. To meet national and departmental nuclear security requirements, DNN R&D leverages the unique facilities and scientific skills of DOE, academia, and industry to perform research including counterterrorism-related R&D, conduct technology demonstrations, develop prototypes, and produce and deliver sensors for integration into operational systems. The FY 2018 Budget increase includes planned activities for early detection of proliferation-related R&D and initiation of a mitigation path for supply chain interruptions.

Nonproliferation Construction

Nonproliferation Construction consolidates construction costs for DNN projects. Currently, the MOX Fuel Fabrication Facility (MFFF) is the only project in this program. The MFFF has experienced a 350% cost growth and 32 year schedule slip since 2007, and multiple independent analysis confirm that the MOX approach to plutonium disposition would be significantly more expensive than originally anticipated and would require approximately $800 million to $1 billion annually for operations for decades. Thus, the FY 2018 Budget Request proposes to terminate the MOX project and pursue the dilute and dispose strategy as an alternative. The request will support preliminary design upon completion of CD-1, Approve Alternative Selection and Cost Range in FY 2018

Nuclear Counterterrorism and Incident Response Program (NCTIR)

NCTIR evaluates and assesses nuclear or radiological threats and leverages that knowledge to provide interagency policy and contingency planning, training, and capacity building. Specifically, this knowledge supports nuclear incident engagement to strengthen and exercise national and international radiological and nuclear counterterrorism, counterproliferation, incident response, and nuclear forensics capabilities. The FY 2018 Request for NCTIR supports programs to strategically manage and deploy expert scientific teams and equipment to provide a technically trained, rapid response to nuclear or radiological incidents and accidents worldwide. Additionally, NCTIR executes DOE/NNSA's Emergency Management Enterprise (EME) program that administers implementation and support of emergency management for all DOE/NNSA offices and sites and manages the DOE/NNSA Emergency Operations Center, Emergency Communications Network (ECN), Policy Management, Training, Exercises, and Continuity of Operations Plan (COOP) activities.

Highlights and Major Changes in the FY 2018 Budget

The DNN FY 2018 Budget Request supports the following key priorities:

Defense Nuclear Nonproliferation Programs

- Convert and/or verify the shutdown of research reactors and isotope production facilities;
- Identify and eliminate excess HEU and plutonium, including removing and/or disposing of 214 kilograms of material;
- Pursue the dilute and dispose strategy to fulfill the United States' commitment to dispose of 34 metric tons of plutonium;
- Support nuclear security best practices exchanges and/or training courses with more than 20 countries in Europe, Middle East, Africa, Asia, and Latin America;
- Complete security upgrades at an additional 90 buildings with high-priority radioactive sources (45 domestic sites and 45 international sites);
- Deploy 20 mobile radiation detection systems and equip 16 new sites, along with associated training and maintenance support, to help counter the threat of illicit trafficking of special nuclear material; the bulk of these systems will be deployed in countries in Eastern Europe, the Middle East, and Africa;
- Provide critical mission support to the IAEA, including strengthening the international nuclear safeguards system and supporting their expanding nuclear security activities;
- Advance U.S. capabilities for early detection and discovery of foreign nuclear weapons development activities;
- Increase U.S. capabilities to improve nuclear weapons and material security, including detecting special nuclear material movement and diversion and monitoring warheads and safeguards, and
- Sustain and improve U.S. capabilities in nuclear explosion monitoring including developing satellite payload activities that support treaty monitoring and military missions.

Nuclear Counterterrorism and Incident Response Program (NCTIR)

- Recapitalize priority nuclear counterterrorism emergency response equipment including neutron multiplicity detectors, specialized search equipment, and contamination monitoring systems,
- Build and sustain a highly secure field deployable incident response communications network for critical real-time information sharing between scientific experts, operational assets, and executive decision makers throughout the government in support of new Presidential policy requirements, and
- Maintain and strengthen the Department's capabilities to plan for and manage incidents and emergencies at its operating locations and contribute technical assistance capability to enhance Emergency Management and upgrade the ECN Suite to state of art capabilities.

DOE Working Capital Fund (WCF) Support

The NNSA Defense Nuclear Nonproliferation appropriation projected contribution to the DOE WCF for FY 2018 is $5,892,000. This funding covers shared enterprise activities including managing enterprise-wide systems and data, telecommunications, and supporting the integrated acquisition environment.

Legacy Contractor Pensions

Funding provides the annual DNN share of the DOE's reimbursement of payments made to the University of California (UC) Retirement Plan (UCRP) for former UC employees and annuitants who worked at the Lawrence Livermore National Laboratory (LLNL) and Los Alamos National Laboratory (LANL). The UCRP benefit for these individuals is a legacy cost and DOE's annual payment to the UC is required by contract. The amount of the annual payment is based on the actuarial valuation report and is covered by the terms described in the contracts. The UC Board of Regents voted in November 2015 to include more conservative assumptions on mortality and interest rates increasing NNSA's costs in FY 2018 relative to the FY 2018 column of the FY 2017 FYNSP. NNSA's budget request supports the increased costs and readjusted the split between Weapons and DNN to reflect the changes in relative shares of total NNSA funding in FY 2018. These contracts will be paid through the Legacy Contractor Pension line item.

Entry Level Hires

NNSA supports a variety of programs to help train and recruit the next generation of leaders in managing the nuclear stockpile, nonproliferation, nuclear security, and international security, such as the NNSA Graduate Fellowship Program (NGFP). These programs foster the pipeline of qualified professionals who will sustain expertise in these areas through future employment within the nuclear security enterprise.

In FY 2018, the DNN appropriation will provide up to $3,200,000 for NGFP support and development activities.

Defense Nuclear Nonproliferation
Funding by Congressional Control

	(Dollars in Thousands)			
	FY 2016 Enacted	FY 2017 Annualized CR*	FY 2018 Request	FY 2018 vs FY 2016
Defense Nuclear Nonproliferation Appropriation				
Defense Nuclear Nonproliferation				
Global Material Security				
International Nuclear Security	130,527	128,846	46,339	-84,188
Radiological Security	153,749	151,769	146,340	-7,409
Nuclear Smuggling Detection	142,475	140,640	144,429	+1,954
International Contributions [a] (non-add)	[6,538]	0	0	0
Total, Global Material Security	**426,751**	**421,255**	**337,108**	**-89,643**
Material Management and Minimization				
HEU Reactor Conversion	115,000	113,519	125,500	+10,500
Nuclear Material Removal	115,000	113,519	32,925	-82,075
Material Disposition	86,584	85,469	173,669	+87,085
Total, Material Management and Minimization	**316,584**	**312,507**	**332,094**	**+15,510**
Nonproliferation and Arms Control	**130,203**	**128,526**	**129,703**	**-500**
Defense Nuclear Nonproliferation R&D	**419,333**	**413,933**	**446,095**	**+26,762**
Nonproliferation Construction				
99-D-143 Mixed Oxide (MOX) Fuel Fabrication Facility, SRS	340,000	335,622	270,000	-70,000
18-D-150 Surplus Plutonium Disposition (SPD) Project	0	0	9,000	+9,000
Total, Nonproliferation Construction	**340,000**	**335,622**	**279,000**	**-61,000**
Total, Defense Nuclear Nonproliferation Programs	**1,632,871**	**1,611,844**	**1,524,000**	**-108,871**
Nuclear Counterterrorism Incident Response Program	**234,390**	**231,372**	**277,360**	**+42,970**
Legacy Contractor Pensions	**94,617**	**93,399**	**40,950**	**-53,667**
Subtotal, Defense Nuclear Nonproliferation Appropriation	**1,961,878**	**1,936,614**	**1,842,310**	**-119,568**
Use of Prior Year Balances	**-21,576**	**0**	**0**	**+21,576**
Recission of Prior Year Balances	**0**	**0**	**-49,000**	**-49,000**
Total, Defense Nuclear Nonproliferation Appropriation	**1,940,302**	**1,936,614**	**1,793,310**	**-146,992**

* The FY 2017 Annualized CR amounts reflect the P.L. 114-254 continuing resolution level annualized to a full year. These amounts are shown only at the congressional control level and above, below that level, a dash (-) is shown.

[a] The international contributions received by the GMS program shown in the FY 2016 Enacted column are a non-add to the FY 2016 Appropriation. The amount received in FY 2016 totaled $6,538,165 includes $5,414,640 from Canada, $307,895 from Finland, $215,660 from the Kingdom of Norway, $134,970 from the Netherlands, and $465,000 from the Republic of Korea.

The Use of Prior Year Balances for FY 2016 includes $21,000,000 in prior year funding from Russia-related nonproliferation activities and $576,000 from funds set aside to meet the apportionment restriction related to NNSA pension funding.

SBIR/STTR:

- FY 2016 Transferred: SBIR: $6,784; STTR: $1,017
- FY 2017 Projected: SBIR: $7,828; STTR: $1,101
- FY 2018 Projected: SBIR: $8,440; STTR: $1,187

Defense Nuclear Nonproliferation
Research and Development

The Office of Management and Budget (OMB) Circular No. A-11, "Preparation, Submission, and Execution of the Budget", requires the reporting of research and development (R&D) data. Consistent with this requirement, R&D activities funded by NNSA are displayed below.

	(Dollars in Thousands)			
	FY 2016 Enacted	FY 2017 Annualized CR	FY 2018 Request	FY 2018 vs FY 2016
Research and Development (R&D)				
Basic	104,500	106,280	113,204	+8,704
Applied	157,276	159,133	169,500	+12,224
Development	58,862	59,533	63,450	+4,588
Subtotal, R&D	**320,638**	**324,946**	**346,154**	**+25,516**
Equipment	0	0	0	0
Construction	0	0	0	0
Total, R&D	**320,638**	**324,946**	**346,154**	**+25,516**

* The FY 2017 Annualized CR amounts reflect the P.L. 114-254 continuing resolution level annualized to a full year. These amounts are shown only at the congressional control level and above, below that level, a dash (-) is shown.

Material Management and Minimization

Overview

The FY 2018 Material Management and Minimization (M^3) budget request responds to the following priorities: minimizing the civilian use of highly enriched uranium (HEU); efforts to secure or eliminate the world's most vulnerable nuclear weapon materials; dispose of excess nuclear weapons in the United States. The M^3 Budget Request presents an integrated approach to addressing the persistent threat posed by the global stockpile of nuclear materials. The primary objectives of the program are to minimize and, when possible, eliminate nuclear materials and ensure sound management principles for materials that remain.

M^3 directly contributes to and plays a critical role to reduce global nuclear security threats. The M^3 program is a key component of DOE/NNSA's integrated nonproliferation, counterterrorism, and emergency response strategies. M^3 makes these strategic contributions through HEU and plutonium disposition, conversion of research reactors and medical isotope production facilities from the use of HEU to the use of low enriched uranium (LEU) fuels and targets, and removal of excess HEU and separated plutonium.

Highlights of the FY 2018 Budget Request

- The Conversion subprogram will continue the pursuit of research reactor and isotope production facility conversions and/or verification of shutdowns. Three facilities will be converted or verified as shutdown in FY 2018.
- The Conversion subprogram will continue to support its molybdenum-99 (Mo-99) commercial partners to establish a reliable commercial supply of Mo-99 produced without HEU and assist global Mo-99 production facilities to eliminate the use of HEU targets by the end of 2018.
- The Conversion subprogram will continue to implement the Uranium Lease and Take-Back (ULTB) program in accordance with the American Medical Isotopes Production Act of 2012.
- The Conversion subprogram will support the implementation of the Joint Comprehensive Plan of Action (JCPOA) to address Iran's nuclear program through conversion of the Arak Reactor.
- The Nuclear Material Removal subprogram will continue to identify and eliminate excess HEU and plutonium, including removing and/or disposing of 214 kilograms of material.
- The Material Disposition subprogram will pursue the dilute and dispose strategy to fulfill the United States' commitment to dispose of 34 metric tons of plutonium.
- The Material Disposition subprogram will continue to eliminate surplus HEU through down-blending to LEU or direct disposal with a priority on legacy material to reduce risk.

Material Management and Minimization
Funding

(Dollars in Thousands)

	FY 2016 Enacted	FY 2017 Annualized CR*	FY 2018 Request	FY 2018 vs FY 2016
Material Management and Minimization				
HEU Reactor Conversion	115,000	113,519	125,500	+10,500
Nuclear Material Removal	115,000	113,519	32,925	-82,075
Material Disposition	86,584	85,469	173,669	+87,085
Total, Material Management and Minimization	**316,584**	**312,507**	**332,094**	**+15,510**

* The FY 2017 Annualized CR amounts reflect the P.L. 114-254 continuing resolution level annualized to a full year. These amounts are shown only at the congressional control level and above, below that level, a dash (-) is shown.

Material Management and Minimization
Explanation of Major Changes
(Dollars in Thousands)

	FY 2018 vs FY 2016
Material Management and Minimization	
HEU Reactor Conversion: The increase in funding reflects a key irradiation test required to demonstrate the new high density LEU fuel being qualified to convert the remaining high performance research reactors in the United States, as well as efforts to scale up the fabrication process for this fuel.	+10,500
Nuclear Material Removal: The decrease in funding reflects the political and technical challenges that have delayed implementation of several removal efforts including those in Belarus, Iran, Kazakhstan, and Pakistan. Due to these delays, the program is projecting to cost less than expected in FY 2017 and will use uncosted balances to continue these removal efforts under the existing operating paradigm in FY 2018.	-82,075
Material Disposition: The increase in funding is reflected in the two subprograms within the Material Disposition Program. Under U.S. Plutonium Disposition subprogram, the increase is primarily attributed to the depletion of prior-year uncosted balances. In addition, the increase supports the continuation of the development of the lifecycle cost estimate and schedule for the dilute and dispose alternative. Under U.S. Uranium Disposition subprogram, the increase is to offset the decline in uranium market prices impacting the barter with uranium resulting in the requirement to pay the difference with appropriated funds.	+87,085
Total, Material Management and Minimization	**+15,510**

Material Management and Minimization
Conversion

Description

The Conversion subprogram, referred to as the Convert subprogram, supports the conversion of domestic and international civilian research reactors and isotope production facilities to non-weapons usable nuclear materials. These efforts result in permanent threat reduction by minimizing and, to the extent possible, eliminating the use of HEU in civilian applications. This includes working with global Mo-99 producers to convert their existing operations to use LEU targets and accelerating the development of new non-HEU-based Mo-99 production capabilities in the United States.

The Convert subprogram will continue to support the JCPOA by facilitating timely progress toward final design of Iran's Arak reactor. The subprogram has primary responsibility for verifying that the design continues to meet all JCPOA non-proliferation goals as the design matures.

The Convert subprogram will continue pursuing reactor conversions and verifying shutdowns both domestically and abroad. As of the end of FY 2016, the program converted or verified the shutdown of 97 HEU research reactors and isotope production facilities worldwide. As part of this effort, the program will continue its work to qualify a high-density LEU fuel and to demonstrate the fabrication capability necessary to convert six U.S. high performance research reactors from HEU to LEU fuel. These high performance research reactors cannot convert with existing LEU fuels and require larger amounts of HEU to operate than standard research reactors. FY 2018 funding will support work such as critical experiments that will allow for the selection of a fuel fabrication process and demonstrate the ability to fabricate and irradiate prototypic fuel plates using a commercial-scale fabrication process. Additionally, the Convert subprogram will submit its preliminary Fuel Qualification Report to the Nuclear Regulatory Commission, a key step on the way to qualifying the new high-density LEU fuel for use in U.S. high performance research reactors.

The Convert subprogram will also continue to provide support to accelerate the establishment of new, non-HEU-based Mo-99 production facilities in the United States. Building on prior-year support, the Convert subprogram's domestic cooperative agreement partners have been making progress toward commercially producing Mo-99 in the United States without the use of HEU. Funding in FY 2018 will allow NNSA to fully fund each of the four awards it has made to commercial partners to support Mo-99 production in the United States.

The Convert subprogram will continue the ULTB program that was required by the American Medical Isotopes Production Act of 2012. Under this activity, DOE makes LEU available to commercial entities through lease contracts for the domestic production of Mo-99 and takes back material that does not have a commercial disposition pathway after use by the commercial entities. The ULTB program concluded its first lease contract in July 2016 and its first LEU shipment in December 2016. NNSA anticipates multiple new customers in 2017 and 2018. The Y-12 facility will continue to assist in managing the execution of LEU lease contracts under the ULTB Program. In FY 2018, Y-12 will produce, package, and deliver approximately 250 kg of LEU to ULTB customers. NNSA currently supports the ULTB actions through DNN funding, and DOE/NNSA has requested the establishment of a general revolving fund to complete the ULTB work in FY 2018.

HEU Reactor Conversion

Activities and Explanation of Changes

FY 2016 Enacted	FY 2018 Request	Explanation of Changes FY 2018 vs. FY 2016
HEU Reactor Conversion $115,000,000	**HEU Reactor Conversion $125,500,000**	**HEU Reactor Conversion +$10,500,000**
• Converted an additional three reactors and isotope production facilities in FY 2016 for a total of 97 including China's Miniature Neutron Source Reactor (MNSR). • Provided technical and financial support to the U.S. private sector to accelerate establishment of a reliable domestic production capability for Mo-99 without the use of HEU and to existing global Mo-99 producers to convert from the use of HEU to LEU targets. • Established the ULTB program.	• Convert an additional one reactor and two isotope production facilities for a total of 104 facilities converted or verified as shutdown. • Provide technical and financial support to the U.S. private sector to accelerate establishment of a reliable domestic production capability for Mo-99 without the use of HEU and to existing global Mo-99 producers to convert from the use of HEU to LEU targets. • Continue implementing the ULTB program. • Begin key irradiation test for new high-density LEU fuel.	• The increased funding reflects a key irradiation test required to demonstrate the new high density LEU fuel being qualified to convert the remaining high performance research reactors in the United States, as well as efforts to scale up the fabrication process for this fuel.

Material Management and Minimization
Nuclear Material Removal

Description

The Nuclear Material Removal subprogram, referred to as the Remove subprogram, supports the removal, consolidation, and disposal of excess nuclear material from civilian sites worldwide. Each kilogram of this material that is removed reduces the risk of a terrorist acquiring the material for use in a nuclear weapon.

This subprogram supports the removal, consolidation, and disposal of U.S.-origin HEU and LEU (from Training Research Isotope General Atomics (TRIGA) and Material Test Reactor (MTR)-type reactors), Russian-origin HEU, and other high-risk nuclear materials ("Gap" material). The subprogram will continue to support the removal of U.S.-origin HEU and LEU spent fuel to the United States until FY 2019, as part of an incentive for countries to convert research reactors from HEU to LEU. The Remove subprogram also will continue to remove Russian-origin HEU from third-party countries and support the removal and disposal of vulnerable, high-risk nuclear materials that are not covered by the Russian-origin and U.S.-origin Nuclear Material Removal activities. This includes U.S.-origin HEU other than TRIGA and MTR fuel, HEU of non-U.S. and non-Russian-origin, and separated plutonium.

The subprogram continues to evaluate all excess nuclear material to identify and prioritize candidates for removal or disposition. The Remove subprogram evaluates material attractiveness, site and country level threats, and other factors to determine materials that are most at-risk and prioritize them for removal or disposal. Furthermore, the subprogram works with foreign partners to obtain regulatory permits; characterize, stabilize, package, and transport material; and provide replacement LEU, or other incentives for other than high income economy countries, to encourage elimination of these dangerous materials.

In addition, as part of its mission to address emerging threats, the Remove subprogram will continue to develop the capability to rapidly respond, if asked, to support the removal of nuclear material from countries of concern (e.g., Libya 2004). This includes in-country stabilization, packaging, and removal of nuclear materials (focusing on HEU and plutonium) through the deployment of self-sufficient, trained rapid response teams and mobile facilities. The Remove subprogram will be conducting a mock deployment of the emerging threats capabilities in a tropical environment during the third quarter in FY 2017. This mock deployment will test equipment capabilities and increase personnel proficiency while working alongside other agency partners.

Furthermore, the subprogram will focus on the development of international plutonium management strategies with countries other than Russia, by developing bi-lateral and multi-lateral working arrangements. Participating countries will work together at a technical level to support efforts to manage plutonium inventories in a way that minimizes the stockpiles of excess plutonium and maximizes the security and protection of the material.

Nuclear Material Removal

Activities and Explanation of Changes

FY 2016 Enacted	FY 2018 Request	Explanation of Changes FY 2018 vs. FY 2016
Nuclear Material Removal $115,000,000	**Nuclear Material Removal $32,925,000**	**Nuclear Material Removal -$82,075,000**
• Removed and/or confirmed the disposition of an additional 728 kilograms of HEU and plutonium from Argentina, Indonesia, Georgia, Switzerland, Germany, Japan, Kazakhstan, Poland, the United Kingdom and Canada for a cumulative total of 6,104 kilograms. • Continued to ensure a short-term readiness posture to deploy assets rapidly to assist in recovery of nuclear materials by conducting preventative equipment maintenance, conducting limited scope performance tests, and replacing equipment to maintain state-of-the-art technical capability.	• Remove and/or confirm the disposition of an additional 214 kilograms of HEU and/or plutonium for a cumulative total of 6,499 kilograms. • Initiate lessons learned from the emerging threats mock deployment to be completed in FY 2017.	• The decreased funding reflects the political and technical challenges that have delayed implementation of several removal efforts including those in Belarus, Iran, Kazakhstan, and Pakistan. Due to these delays, the program is projecting to cost less than expected in FY 2017 and will use uncosted balances to continue removal efforts in FY 2018. Therefore, less new budget authority is requested in FY 2018.

Material Management and Minimization
Material Disposition

Description

The Material Disposition subprogram, referred to as the Dispose subprogram, is responsible for disposing of surplus weapon-grade plutonium and HEU in the United States and managing the provision of nuclear material for peaceful uses.

The Dispose subprogram includes activities that are necessary to support the overall material disposition program to dispose of surplus weapon-grade plutonium including surplus nuclear weapon pit disassembly and conversion of resultant metal to oxide, which is being conducted in the Advanced Recovery and Integrated Extraction System (ARIES) at LANL and surveillance and monitoring of surplus pits at Pantex.

The Consolidated Appropriations Act, 2016 directed that construction on the Mixed Oxide Fuel Fabrication Facility (MFFF) project continue and provided up to $5 million to advance further planning; resolve regulatory and other issues; complete conceptual design activities for the dilute and dispose alternative; and develop and submit to Congress a report that includes an evaluation of program risks, lifecycle cost estimate, and schedule for the dilute and dispose alternative. This work was initiated in FY 2016 and continued in FY 2017. However during the FY 2017 Continuing Resolution, funding was constrained at the FY 2016 levels. Therefore, work was significantly slowed and will not be completed in FY 2017 as originally planned. The FY 2018 Budget Request supports the Administration's proposal to terminate MFFF project and will pursue the dilute and dispose strategy to fulfill the United States' commitment to dispose of 34 metric tons of plutonium. The dilute and dispose strategy consists of blending plutonium with an inert mixture, packaging, and disposing of it in a geologic repository.

50 US Code 2746 requires that if the estimated cost of completing a conceptual design for a construction project exceeds $3,000,000 the Secretary shall submit to Congress a request for funds for the conceptual design before submitting a request for funds for the construction project. NNSA anticipates that the estimated cost to complete the conceptual design of the following projects will likely exceed the $3,000,000 threshold:

1. Surplus Plutonium Disposition (SPD) Project (Supports the Dilute and Dispose (D&D) Capability) - During FY 2016, pre-conceptual design was completed, and the Department confirmed that the existing CD-0 milestone approving mission need for plutonium disposition would apply to the dilute and dispose approach. During FY 2017 and 2018, an Analysis of Alternatives and conceptual design will be performed and completed to support a CD-1 Approve Alternative Selection and Cost Range in FY 2018 for the project.

2. Japan's Fast Critical Assembly (FCA) – During FY 2016, the removal of all Pu from the FCA was completed and transported to the SRS. During FY 2016, the pre-conceptual analysis was developed to support a CD-0 Approval of Mission Need in FY 2017. At this time, NNSA is evaluating options for an alternative approach that may reduce overall disposition costs for this material. Japan will contribute funds for the disposition of the material.

In FY 2018, the Dispose subprogram will complete efforts to prepare a detailed lifecycle cost estimate for the dilute and dispose alternative and complete an independent validation of that estimate, which includes surveillance and packaging of surplus pits at Pantex, pit disassembly and oxide conversion at LANL, HB-Line operations at SRS, dilution and disposal of the plutonium, all projects at the various sites needed to execute the program, and any other supporting costs required for the program baseline. Furthermore, the DOE/NNSA will continue the environmental analyses for the disposal of surplus plutonium.

Over the past decade, NNSA has eliminated more than 154 metric tons (MT) of weapons-usable HEU by down-blending it to low enriched uranium (LEU) or shipped HEU material for down-blending to use in power and research reactors in the United States and abroad. The program has substantially reduced holdings of fissile materials throughout DOE/NNSA complex, rid the world of 6,160 weapons worth of unneeded bomb material, helped reduce civil use of HEU worldwide, and made a significant contribution to electricity supplies. The program has also been able to off-set appropriations for the program by using bartering to pay for commercial down-blending services, and funds received from the sale of LEU are returned to the U.S. Treasury. However due to an increase in down-blending costs and reduced market value of LEU, all derived LEU is bartered to WesDyne as compensation and cash payments supplement the barter. The value of the derived LEU directly correlates to the market price of uranium, and as the value of the LEU declines due to the price drop in uranium, the amount of cash payments to supplement the barter grows. The decline in the price of uranium is a significant challenge for the HEU Disposition Program and therefore requires more appropriated funds to continue the down-blending program. The future focus is to continue progress in down-blending HEU to meet nonproliferation objectives and the development of future projects from unallocated HEU inventories.

The Dispose subprogram will continue to address disposition of legacy material in Building 9206 at Y-12 in order to reduce risk. The current necessity of reducing the material inventory in Building 9206 is due to the aging infrastructure where the material is stored. At the current pace, the entire population of these materials will be disposed of by the end of FY 2020.

The Dispose subprogram is also responsible for managing enriched uranium supply and demand needs and commitments in support of DNN statutory obligations and mission goals to support the provision of Material for Peaceful Uses. This will include oversight of contractor management of the LEU for the American Assured Fuel Supply (AAFS), the conversion of research reactors, and medical isotope production. These activities support U.S. government nonproliferation and nuclear security objectives to discourage development of indigenous enrichment and reprocessing capabilities by other countries and minimize the use of HEU in civilian nuclear applications.

Material Disposition

Activities and Explanation of Changes

FY 2016 Enacted	FY 2018 Request	Explanation of Changes FY 2018 vs. FY 2016
Material Disposition $86,584,000	**Material Disposition $173,669,000**	**Material Disposition +$87,085,000**
U.S. Plutonium Disposition $54,504,000	**U.S. Plutonium Disposition $113,669,000**	**U.S. Plutonium Disposition +$59,165,000**
• Maintained capability to disassemble nuclear weapons pits and converted them into plutonium oxide for eventual disposition. The conversion uses the LANL ARIES process and is part of the 2 MT campaign. • Continued plutonium oxide production for eventual disposition at the SRS's H-Canyon facility. • Continued to provide storage, surveillance, and packaging capabilities for surplus pits and plutonium at Pantex. • Began pre-conceptual design and lifecycle baseline development for the dilute and dispose alternative. • Maintained the Waste Solidification Building (WSB) facility in a lay-up configuration. • Supported the ongoing maintenance of critical programmatic documents including the Program Execution Plan, integrated schedules, performance measures, NEPA documentation, memoranda of agreement, analysis for plutonium disposition, and interface control documents; minimal required infrastructure and erosion control maintenance required to comply with safety and environmental standards; and DNN's portion of the SRS-wide common infrastructure maintenance activities including site roads, bridges, barricades, and utility distribution systems.	• Continue pit disassembly and oxide conversion activities to prepare plutonium for disposition. • Continue to provide storage, surveillance, and packaging capabilities for surplus pits and plutonium at Pantex. • Complete conceptual design activities for the dilute and dispose alternative to support a CD-1 for surplus plutonium disposition. • Complete an independent validated lifecycle estimate for the dilute and dispose program for surplus plutonium disposition. • Initiate the NEPA process for the dilute and dispose alternative. • Maintain the WSB facility in a lay-up configuration while the Department determines options for future use. • Evaluate options for the de-cladding and conversion project to ensure the approach pursued for the Japanese Pu is the lowest cost possible for disposition. • Support the ongoing maintenance of critical programmatic documents including the Program Execution Plan, integrated schedules, performance measures, NEPA documentation, memoranda of agreement, analysis for plutonium disposition, and interface control documents; minimal required infrastructure and erosion control maintenance required to comply with safety and environmental standards; and DNN's portion of the SRS-wide common infrastructure maintenance activities including	• The increase in funding is primarily attributed to the depletion of prior-year uncosted balances in the U.S. plutonium disposition program. In addition, the increase supports the continuation of the development of the lifecycle cost estimate and schedule for the dilute and dispose alternative.

FY 2016 Enacted	FY 2018 Request	Explanation of Changes FY 2018 vs. FY 2016
	site roads, bridges, barricades, and utility distribution systems.	
U.S. Uranium Disposition $31,080,000 • Down-blended or shipped for down-blending of HEU to produce LEU consistent with specifications. • Continued to down-blend HEU into high assay LEU metal for research reactors and for Mo-99 target production, in support of replacing current HEU demand for research reactor fuel and medical isotope production with LEU-based solutions. • Supported tracking and analysis of enriched uranium supply and demand needs and commitments of DNN mission goals.	**U.S. Uranium Disposition $60,000,000** • Down-blend or ship for down-blending HEU to produce LEU consistent with specifications. • Continue to down-blend HEU into high assay LEU metal for research reactors and for Mo-99 target production, in support of replacing current HEU demand for research reactor fuel and medical isotope production with LEU-based solutions. • Continue cleanup of legacy material in Y-12's Building 9206 to reduce risk. • Support tracking and analyzing enriched uranium supply and demand needs and commitments of DNN mission goals.	**U.S. Uranium Disposition +$28,920,000** • The increase reflects the need for additional appropriated funds to offset the barter of uranium as the market prices for uranium continue to decline.
International Plutonium Disposition $1,000,000	**International Plutonium Disposition $0**	**International Plutonium Disposition -$1,000,000**
• As directed in the Consolidated Appropriation Act, 2016, this program was moved under the Nuclear Materials Removal Program	• As directed in the Consolidated Appropriation Act, 2016, this program is shown and funded under the Nuclear Materials Removal Program.	• As directed in the Consolidated Appropriation Act, 2016, this program is shown and funded under the Nuclear Materials Removal Program.

Material Management and Minimization
Performance Measures

In accordance with the GPRA Modernization Act of 2010, the Department sets targets for, and tracks progress toward, achieving performance goals for each program.

	FY 2016	FY 2017	FY 2018
Performance Goal (Measure)	**Highly Enriched Uranium (HEU) Reactors Converted or Shutdown -** Cumulative number of HEU reactors and isotope production facilities converted or verified as shutdown prior to conversion.		
Target	98 facilities	101 facilities	104 facilities
Result	Not Met - 97	TBD	TBD
Endpoint Target	By 2035, convert or verify the shutdown prior to conversion of approximately 156 HEU reactors and isotope production facilities.		
Performance Goal (Measure)	**Nuclear Material Removed -** Cumulative number of kilograms of vulnerable nuclear material (HEU and plutonium) removed or disposed.		
Target	6,055 kilograms	6,285 kilograms	6,499 kilograms
Result	Exceeded - 6,104	TBD	TBD
Endpoint Target	By 2027, remove or dispose of 7,680 kilograms of vulnerable nuclear material (HEU and plutonium), enough for approximately 300 nuclear bombs.		
Performance Goal (Measure)	**U.S. Highly Enriched Uranium (HEU) Downblended -** Cumulative amount of surplus U.S. highly enriched uranium (HEU) down-blended or shipped for down-blending.		
Target	153 MT	157 MT	160 MT
Result	Exceeded - 154.3	TBD	TBD
Endpoint Target	By the end of FY 2019, complete down-blending of 162 MT of surplus HEU. The overall amount of HEU available for down-blending and the rate at which it will be down-blended is dependent upon decisions regarding the U.S. nuclear weapons stockpile, the pace of warhead dismantlement and receipt of HEU from research reactors, as well as other considerations, such as decisions on processing of additional HEU through H-Canyon and disposition paths for weapons containing HEU.		
Performance Goal (Measure)	**U.S. Plutonium Disposition (H-Canyon) -** Cumulative kilograms of plutonium converted to oxide at Savannah River H-Canyon.		
Target	100 kg	N/A	N/A
Result	Not Met - 7.62	N/A	N/A
Endpoint Target	By the end of FY 2023, complete operations for 3.7 MT of plutonium converted to oxide at Savannah River Site.		

	FY 2016	FY 2017	FY 2018
Performance Goal (Measure)	**U.S. Plutonium Disposition (LANL) -** Cumulative kilograms of plutonium metal converted to oxide at Los Alamos National Laboratory.		
Target	667 kg	N/A	N/A
Result	Met - 667	N/A	N/A
Endpoint Target	By 2029, complete operations for 2 MT (2,000 kg) of plutonium converted to oxide.		
Performance Goal (Measure)	**U.S. Surplus Plutonium Disposition -** Cumulative kilograms (kg) of surplus plutonium converted to oxide in preparation for final disposition.		
Target	N/A	767 kg	867 kg
Result	N/A	TBD	TBD
Endpoint Target	By FY 2028, convert 2 MT (2000 kg) of surplus plutonium to oxide.		

Material Management and Minimization
Capital Summary

(Dollars in Thousands)

	Total	Prior Years	FY 2016 Enacted	FY 2016 Current	FY 2017 Annualized CR	FY 2018 Request	FY 2018 vs FY 2016
Capital Operating Expenses Summary (including Major Items of Equipment (MIE))							
Capital Equipment >$500K (including MIE)	N/A	N/A	4,328	4,328	4,423	4,520	+192
Plant Projects (GPP and IGPP)	N/A	N/A	0	0	0	0	0
Total, Capital Operating Expenses	**N/A**	**N/A**	**4,328**	**4,328**	**4,423**	**4,520**	**+192**
Capital Equipment > $500K (including MIE)							
Total Non-MIE Capital Equipment	N/A	N/A	4,328	4,328	4,423	4,520	+192
Total, Capital Equipment (including MIE)	**N/A**	**N/A**	**4,328**	**4,328**	**4,423**	**4,520**	**+192**
Plant Projects (GPP and IGPP)							
Total Plant Projects (GPP/IGPP) (Total Estimated Cost (TEC) <$5M)	N/A	N/A	0	0	0	0	0
Total, Plant Projects (GPP/IGPP)	**N/A**	**N/A**	**0**	**0**	**0**	**0**	**0**
Total, Capital Summary	**N/A**	**N/A**	**4,328**	**4,328**	**4,423**	**4,520**	**+192**

* The FY 2017 Annualized CR amounts reflect the P.L. 114-254 continuing resolution level annualized to a full year. These amounts are shown only at the congressional control level and above, below that level, a dash (-) is shown.

Global Material Security

Overview

The Global Material Security (GMS) FY 2018 Budget Request supports efforts to improve U.S. national security by preventing terrorists and other non-state actors from obtaining nuclear and radiological material and using this material against the United States and its interests in an improvised nuclear device (IND) or a radiological dispersal device (RDD). GMS works with partner countries to increase the security of vulnerable nuclear materials and facilities and improve partners' abilities to deter, detect, and investigate illicit trafficking of these materials. GMS supports national security priorities to reduce global nuclear security threats, and GMS is a key component of DOE/NNSA's integrated nonproliferation, counterterrorism, and emergency response strategy.

GMS consists of three subprograms: International Nuclear Security, Radiological Security, and Nuclear Smuggling Detection and Deterrence.

GMS provides equipment for physical protection and detection, as well as targeted support to ensure that partner countries are able to sustain the ability to secure, reduce, and interdict nuclear and radioactive materials. All GMS subprograms aim to enhance areas critical to long-term successful operation of equipment such as regulations and inspections, training infrastructure, maintenance, exercises, performance testing, life-cycle planning, and nuclear security culture. To enhance its reach and effectiveness, GMS provides technical and policy support to multilateral organizations, including the International Atomic Energy Agency (IAEA) and the International Police Organization (INTERPOL).

Highlights of the FY 2018 Budget Request

- Support joint development and execution of nuclear security best practices exchanges and training courses at partner countries' nuclear security training centers including India, China, Japan, South Korea, Kazakhstan, and Argentina. These training venues address domestic nuclear security training requirements, and interactions provide for bilateral and regional best practice exchanges.
- Support nuclear security best practices exchanges and/or training courses with more than 20 countries in Europe, the Middle East, Africa, Asia, and Latin America.
- Continue cooperation with Ukraine to include training for National Guard force, security upgrades at South Ukraine Nuclear Power Plant, nuclear security degree program curriculum development, and nuclear security culture enhancement.
- Support IAEA guidance document development, training courses, advisory missions, and subject matter expert assistance to build sustainable, effective nuclear security worldwide furthering U.S. national security objectives.
- Prioritize efforts to ensure effective security for cesium-based devices worldwide; by 2020, secure the most at-risk radiological material in U.S. high-threat urban areas by enhancing local law enforcement response and encouraging the use of technologies reducing potential radiological dispersal device (RDD) risk.
- Complete security upgrades at an additional 90 buildings with high-priority radioactive sources (45 domestic sites and 45 international sites).
- Recover an additional 1,700 disused and unwanted radioactive sealed sources from locations throughout the United States.
- Replace 15 devices, which use high-activity radioactive sources, with non-radioisotopic alternative technologies. Expand education and outreach to encourage a broader adoption of technologies that do not use high activity radioactive sources.
- Deploy 20 mobile radiation detection systems and equip 16 new sites, along with associated training and maintenance support, to help counter the threat of illicit trafficking of special nuclear material; the bulk of these systems will be deployed in countries in Eastern Europe, the Middle East, and Africa.
- Deploy flexible radiation detection capabilities at strategic airports and at small seaports in the Middle East, Caucasus, Southeast Asia, and Eastern Europe. These systems are used to perform targeted screening of commercial air traffic arriving from countries of concern and small maritime vessels not subject to routine regulatory controls.
- Transfer full financial responsibility for training and maintenance of radiation detection systems at 64 international locations bringing the cumulative number of indigenously sustained systems to 684.

Global Material Security
Funding

(Dollars in Thousands)

	FY 2016 Enacted	FY 2017 Annualized CR*	FY 2018 Request	FY 2018 vs FY 2016
Global Material Security				
International Nuclear Security	130,527	128,846	46,339	-84,188
Radiological Security	153,749	151,769	146,340	-7,409
Nuclear Smuggling Detection	142,475	140,640	144,429	+1,954
International Contributions [a]	[6,538]	0	0	0
Total, Global Material Security	**426,751**	**421,255**	**337,108**	**-89,643**

* The FY 2017 Annualized CR amounts reflect the P.L. 114-254 continuing resolution level annualized to a full year. These amounts are shown only at the congressional control level and above, below that level, a dash (-) is shown.

[a] The international contributions received by the GMS program shown in the FY 2016 Enacted column are a non-add to the FY 2016 Appropriation. The amount received in FY 2016 totaled $6,538,165 includes $5,414,640 from Canada, $307,895 from Finland, $215,660 from the Kingdom of Norway, $134,970 from the Netherlands, and $465,000 from the Republic of Korea.

Global Material Security
Explanation of Major Changes
(Dollars in Thousands)

	FY 2018 vs FY 2016
Global Material Security	
International Nuclear Security: The decrease reflects a commitment to reduce prior year carryover balances, permitting a lower FY 2018 Budget Request.	-84,188
Radiological Security: The decrease reflects a reduction in planned security upgrades made possible by the expansion of efforts to replace cesium-137 blood irradiators with x-ray devices.	-7,409
Nuclear Smuggling Detection and Deterrence: Increase supports acceleration of provision of flexible radiation capabilities for targeted screening of maritime small vessels and for high-priority airports.	+1,954
Total, Global Material Security	**-89,643**

Description

The International Nuclear Security (INS) subprogram works with partner countries and multilateral organizations to enhance security of nuclear material at facilities and during transport through infrastructure support, training and regulatory development, equipment upgrades, and other technical exchanges to share best practices.

INS assists partner countries in developing and maintaining a national-level nuclear security infrastructure that improves security practices and supports sustainability of U.S.-funded security upgrades. These collaborative projects contribute to U.S. and partner country national security interests and include developing and strengthening effective nuclear security regulations, training and educational programs, secure transportation, protective force capabilities, material accounting measurement capabilities, protection against cyber threats, and strong nuclear security culture. This includes support for nuclear security training centers that can help maintain expertise and serve as regional resources.

INS also directly supports IAEA's Division of Nuclear Security by contributing to the development of IAEA nuclear security guidance documents and associated curricula. INS also supplies subject matter experts for IAEA training, International Physical Protection Advisory Service (IPPAS) missions, technical and other consultancies, and senior advisory committees. INS assists the IAEA in establishing and implementing programs to improve physical protection, nuclear material accounting and control, insider threat mitigation, transportation security, and cyber security for nuclear materials and nuclear facilities. INS works bilaterally to train foreign partners on physical protection and nuclear security recommendations in IAEA Information Circular (INFCIRC) 225/Revision 5 and knowledge security best practices.

International Nuclear Security

Activities and Explanation of Changes

FY 2016 Enacted	FY 2018 Request	Explanation of Changes FY 2018 vs FY 2016
International Nuclear Security $130,527,000	**International Nuclear Security $46,339,000**	**International Nuclear Security -$84,188,000**
• Completed equipment purchases for the national nuclear training center in Kazakhstan; continued to fund curriculum development. • Conducted technical exchanges and workshops on nuclear security topics with Belarus, India, Israel, Japan, Korea and other international partners. • Supported courses at partner country training facilities on nuclear security topics. • Continued support for nuclear security in key countries of concern. • Continued ongoing capacity building cooperation on the new physical protection security recommendations in INFCIRC 225/Rev 5. • Continued to provide policy and technical expertise to the IAEA for the furtherance of nuclear security initiatives including development of Nuclear Security Series documents, support for IAEA IPPAS missions, and strengthening of nuclear facility best practices, including cyber security best practices.	• Support courses at partner country nuclear security training centers. • Continue ongoing capacity building cooperation on the nuclear security recommendations in INFCIRC 225/Rev 5. • Continue to support the IAEA to further nuclear security initiatives, such as development of Nuclear Security Series documents, IPPAS missions, and strengthening of nuclear facility best practices, including cybersecurity best practices and capacity building with international partners. • Continue providing limited sustainability support to nuclear sites with nuclear security upgrades including support for training, procedures, maintenance, equipment repair, critical spare parts, performance testing, and other activities. • Continue support for enhanced nuclear security culture promoting the importance of personal responsibility for nuclear security with bilateral partner countries in cooperation with the IAEA.	• The decrease reflects a commitment to reduce prior year carryover balances, permitting a lower FY 2018 Budget Request.

Global Material Security
Radiological Security

Description

The Radiological Security (RS) subprogram supports U.S. national security through the protection, reduction, removal, and disposal of high-activity radiological materials domestically and internationally. The RS subprogram reduces the risk of a terrorist acquiring the radiological material necessary for an RDD or "dirty bomb."

RS protects radioactive sources used for vital medical, research, and commercial purposes; removes and disposes disused radioactive sources; and reduces the global reliance on radioactive sources by promoting the adoption and development of non-radioisotopic alternative technologies.

RS works to enhance the security of high-activity radiological materials located at soft targets (e.g. hospitals, universities, etc.) in the United States and in other high priority countries. RS works in close cooperation with national, regional, and local partners and the IAEA. RS implements state-of-the art security solutions to protect radiological material at volunteer sites.

RS supports the removal and disposal of vulnerable excess and abandoned radiological materials by working to accelerate consolidation and disposal of excess, disused, or orphaned radioactive sources and to repatriate high-risk U.S.-origin sources.

RS works to replace radioactive sources with viable, non-isotopic alternative technologies. This permanently reduces risk by obviating the need to introduce sources in the first place. Technologies for alternatives are maturing, and new technologies are entering the market. RS works to disseminate information on these alternative technologies and provide cost-sharing incentives to volunteer organizations willing to transition non-radioisotopic technologies.

In 2018, RS will continue efforts to secure, by 2020, the most at-risk radiological material in U.S. high-threat urban areas by enhancing local law enforcement response and by encouraging the use of technologies that do not pose a dirty bomb risk. Also, RS will prioritize efforts to ensure effective security for cesium-based devices worldwide. RS will continue to prioritize activities to protect, remove, and reduce radioactive sources by considering the most cost effective/risk reduction strategies. Where possible, RS will prioritize permanent threat reduction efforts.

Radiological Security

Activities and Explanation of Changes

FY 2016 Enacted	FY 2018 Request	Explanation of Changes FY 2018 vs FY 2016
Radiological Security $153,749,000	**Radiological Security $146,340,000**	**Radiological Security -$7,409,000**
• Completed security upgrades at an additional 95 domestic buildings containing radiological material including a majority of the Category 1 buildings that volunteered in FY 2015. • Completed security upgrades at an additional 47 buildings containing radiological material internationally. • Removed an additional 2,500 excess and unwanted sealed sources from locations in the United States, resulting in a cumulative total of more than 39,500 sources removed. • Removed disused or orphaned sources internationally and consolidated them into in-country secure storage locations. • Worked with federal, state, and local authorities and volunteer sites to support the sustainability of previously installed security upgrades domestically. • Expanded domestic outreach to increase threat awareness and accelerate efforts to protect highest priority buildings containing radioactive sources; including those in Department of Homeland Security Urban Area Security Initiative-designated cities. • Worked with the IAEA, foreign regulators, and sites to sustain previously installed security upgrades internationally. • Expanded replacement activities at buildings that currently use high activity radioactive sources that agree to switch to non-isotopic based technologies.	• Secure 90 additional buildings that contain high priority radiological material including 45 buildings in the United States and 45 buildings in other high priority countries. • Continue to collaborate with industry on "security by design" to make devices inherently more secure in the manufacturing process. • Work with appropriate authorities and sites to sustain previously installed security upgrades domestically and internationally. • Increase focus internationally on securing and eliminating cesium-based devices. • Remove an additional 1,700 excess and unwanted sealed sources from locations throughout the United States. • Recover and dispose or securely store disused or orphaned radioactive sources in other countries. • Replace 15 devices, which use high-activity radioactive sources, with those that use alternative non-radioisotopic technologies. • Expand education and outreach to encourage a broader adoption of alternative non-isotopic technologies. • Continue to deploy mobile source tracking systems for sources used in the oil and gas industry. • Continue to increase threat awareness in cities designated by the Department of Homeland Security as Urban Area Security Initiative cities, by increasing training and coordination between sites that have high-priority radiological material	• The decrease reflects a reduction in planned security upgrades made possible by the expansion of efforts to replace cesium-137 blood irradiators with x-ray devices.

FY 2016 Enacted	FY 2018 Request	Explanation of Changes FY 2018 vs FY 2016
• Expanded efforts to find better long-term threat reduction solutions; including deploying source tracking tools and further development and application of now nascent technologies that do not rely on radioactive sources.	and local law enforcement agencies responsible for protecting those sites.	

Global Material Security
Nuclear Smuggling Detection and Deterrence

Description

The Nuclear Smuggling Detection and Deterrence (NSDD) subprogram works with partners to deter, detect, and investigate nuclear and radiological trafficking. NSDD provides partners with tailored radiation detection systems based on assessments of high risk smuggling pathways and operational environments. NSDD partners include international law enforcement, intelligence, and border security. To facilitate long term use of systems, NSDD works with partners to indigenize capabilities in the areas of operation and management, training, and maintenance. NSDD coordinates closely with other U.S. government agencies (e.g. Departments of Homeland Security, State, Defense, and Justice) to maximize the impact of U.S. government resources, and collaborates with international organizations such as INTERPOL, IAEA, and the Global Initiative to Combat Nuclear Terrorism (GICNT) to promote consistency in global efforts to counter nuclear smuggling.

Going forward, NSDD will address remaining gaps in detection capabilities in the Global Nuclear Detection Architecture (GNDA), expand flexible detection capabilities for targeted screening at airports and of small maritime vessels, and continue to improve partner country skills. NSDD will conduct operator trainings; technical training on equipment maintenance repair; and topical workshops, drills, exercises, and similar events designed to test, evaluate, and improve system performance and effectiveness.

NSDD will continue to work to transition responsibility for operation and maintenance to host country partner organizations and continue to engage with partners to share best practices related to operation and maintenance.

NSDD will continue efforts to strengthen foreign partner nuclear forensics analytical capability and best practices, to give partners the tools to identify interdicted materials. These tools are integral to a robust program to deter illicit trafficking. NSDD will engage up to 19 partners bilaterally to strengthen nuclear forensics capabilities. NSDD will also work multilaterally with the IAEA and the GICNT on the development of international guidance documents and events to advance partner country technical expertise in nuclear forensics.

Nuclear Smuggling Detection and Deterrence

Activities and Explanation of Changes

FY 2016 Enacted	FY 2018 Request	Explanation of Changes FY 2018 vs FY 2016
Nuclear Smuggling Detection and Deterrence $142,475,000	**Nuclear Smuggling Detection and Deterrence $144,429,000**	**Nuclear Smuggling Detection and Deterrence +$1,954,000**
• Provided 21 additional mobile and man-portable systems for use by law enforcement at internal checkpoints in countries of strategic interest. • Continued providing training in equipment maintenance and alarm response to law enforcement in approximately 15 countries. • Completed installation of fixed radiation detection systems at approximately 31 sites in 10 countries, focusing on key gaps in the global nuclear detection architecture and major hubs in the global maritime shipping network. • Connected sites to national communications systems in three countries. • Continued to transition full responsibility for the long term operation (sustainability) of over 200 sites/ports where the systems have been installed but are not yet indigenously sustained. • Continued outreach and technical collaboration with governments and industry to encourage and support provision of radiation detection equipment at large-container seaports. • Continued to support development of protocols for partner countries to rapidly coordinate across agencies and mobilize assets during times of enhanced steady state operations. • Supported assurance visits to verify continued operation of equipment installed in 55+ countries. • Funded international exercises and workshops, on optimal operation of equipment and	• Provide 20 additional mobile and man-portable systems for use by law enforcement at internal checkpoints in countries along known smuggling routes. • Equip 16 official crossing points to close key gaps in the global nuclear detection architecture. • Provide flexible radiation detection capabilities for targeted screening of maritime small vessels and for high-priority airports in the Middle East, Eastern Europe, Africa and Asia. • Continue connecting radiation detection sites to national communications systems in six countries. • Continue to support capacity building activities in countries where systems have been installed but are not indigenously sustained. • Transition 64 radiation detection systems to indigenous sustainment. • Maintain engagements to encourage continued commitment, maintain visibility, and share best practices. • Conduct approximately 40 events, workshops, or exercises to advance partner country capabilities in radiation detection, equipment maintenance, and forensics.	• Increase supports acceleration of provision of flexible radiation capabilities for targeted screening of maritime small vessels and for high-priority airports.

FY 2016 Enacted	FY 2018 Request	Explanation of Changes FY 2018 vs FY 2016
improved regional response to trafficking incidents. • Provided technical expertise and support to ongoing indigenous improvements of installed radiation detection programs in partner countries including analysis of data provided to NSDD. • Provided limited technical support to over 530 sites/ports already transitioned to partner country responsibility. • Engaged bilaterally with up to 13 foreign partners to strengthen nuclear forensics capabilities. • Worked with IAEA and the GICNT on the development of guidance documents, best practices, and other key forensics issues.		

Global Material Security
Performance Measures

In accordance with the GPRA Modernization Act of 2010, the Department sets targets for, and tracks progress toward, achieving performance goals for each program.

	FY 2016	FY 2017	FY 2018
Performance Goal (Measure)	**Mobile Detection System (MDS) -** Cumulative number of Mobile Detection Systems (MDS) deployed.		
Target	117 MDS	137 MDS	157 MDS
Result	Met - 117	TBD	TBD
Endpoint Target	By the end of FY 2019, deploy 167 Mobile Detection Systems.		
Performance Goal (Measure)	**Radiological Buildings Protected -** Cumulative number of buildings with high-priority radiological materials secured.		
Target	2,027 buildings	2,116 buildings	2,206 buildings
Result	Exceeded - 2,100	TBD	TBD
Endpoint Target	4394 by 2033		
Performance Goal (Measure)	**Sites -** Cumulative number of sites with radiation detection systems deployed.		
Target	599 cumulative sites	618 cumulative sites	634 cumulative sites
Result	Exceeded - 606	TBD	TBD
Endpoint Target	By the end of FY 2019, provide radiation detection systems to approximately 639 cumulative sites.		
Performance Goal (Measure)	**Sustainability -** Cumulative number of radiation detection systems that are being indigenously sustained.		
Target	558 cumulative radiation detection systems	620 cumulative radiation detection systems	684 cumulative radiation detection systems
Result	Not Met - 538	TBD	TBD
Endpoint Target	By the end of FY 2020, transfer 786 radiation detection systems to indigenous sustainment.		

Global Material Security
Capital Summary

(Dollars in Thousands)

	Total	Prior Years	FY 2016 Enacted	FY 2016 Current	FY 2017 Annualized CR*	FY 2018 Request	FY 2018 vs FY 2016
Capital Operating Expenses Summary (including Major Items of Equipment (MIE))							
Capital Equipment >$500K (including MIE)	N/A	N/A	1,250	1,250	1,278	1,306	+56
Plant Projects (GPP and IGPP)	N/A	N/A	0	0	0	0	0
Total, Capital Operating Expenses	**N/A**	**N/A**	**1,250**	**1,250**	**1,278**	**1,306**	**+56**
Capital Equipment > $500K (including MIE)							
Total Non-MIE Capital Equipment	N/A	N/A	1,250	1,250	1,278	1,306	+56
Total, Capital Equipment (including MIE)	**N/A**	**N/A**	**1,250**	**1,250**	**1,278**	**1,306**	**+56**
Plant Projects (GPP and IGPP)							
Total Plant Projects (GPP/IGPP) (Total Estimated Cost (TEC) <$5M)	N/A	N/A	0	0	0	0	0
Total, Plant Projects (GPP/IGPP)	**N/A**	**N/A**	**0**	**0**	**0**	**0**	**0**
Total, Capital Summary	**N/A**	**N/A**	**1,250**	**1,250**	**1,278**	**1,306**	**+56**

* The FY 2017 Annualized CR amounts reflect the P.L. 114-254 continuing resolution level annualized to a full year. These amounts are shown only at the congressional control level and above, below that level, a dash (-) is shown.

Nonproliferation and Arms Control

Overview

The Nonproliferation and Arms Control (NPAC) program plays a critical role and directly contributes to U.S. Government efforts to reduce global nuclear security threats. Specifically, the NPAC program works to strengthen the nonproliferation and arms control regimes by applying its unique expertise to develop and implement programs and strategies to: strengthen international nuclear safeguards; control the spread of nuclear material, equipment, technology, and expertise; verify nuclear reductions and compliance with nonproliferation and arms control treaties and agreements; and develop programs and strategies to address nuclear nonproliferation and arms control challenges and opportunities. The NPAC program pursues these objectives through four subprograms: (1) International Nuclear Safeguards; (2) Nuclear Export Controls; (3) Nuclear Verification; and (4) Nonproliferation Policy.

Highlights of the FY 2018 Budget Request

- Meet standing DOE/NNSA statutory and treaty/agreement obligations and authorities, including: (a) Physical security assessment visits for U.S.-obligated materials at foreign facilities; (b) Implementing U.S. safeguards obligations under the U.S. Voluntary Offer Agreement/Additional Protocol; (c) U.S. nonproliferation and export control activities (license application and interdiction case technical reviews, 123 Agreements, 10 CFR Part 810 authorizations); (d) Safeguards training; and (e) Implementing DOE obligations under the Plutonium Production Reactor Agreement, Chemical Weapons Convention and Biological and Toxin Weapons Convention.
- Support compliance analysis and implementation of the New START Treaty, the Intermediate-Range Nuclear Forces (INF) Treaty, and the Open Skies Treaty.
- Support implementation of the Joint Comprehensive Plan of Action (JCPOA) to address Iran's nuclear program through safeguards and export control activities.
- Strengthen the U.S. safeguards technology and human capital base to meet projected U.S. and International Atomic Energy Agency (IAEA) resource requirements.
- Field test and finalize advanced safeguards approaches for the International Atomic Energy Agency (IAEA) for Gas Centrifuge Enrichment Plants.
- Engage 25-35 foreign partners to strengthen national systems of export control and prevent illicit trafficking in nuclear and dual-use commodities through export licensing and enforcement training programs.
- Work with other DOE and interagency partners to facilitate the expansion of civil nuclear power while minimizing proliferation risks through international outreach and capacity building in nuclear safeguards and export controls.
- Provide nonproliferation assessments of emerging nuclear technologies.
- Maintain technical and manpower readiness for future U.S.-led denuclearization and verification activities.

Nonproliferation and Arms Control
Funding

	(Dollars in Thousands)			
	FY 2016 Enacted	FY 2017 Annualized CR*	FY 2018 Request	FY 2018 vs FY 2016
Nonproliferation and Arms Control				
International Nuclear Safeguards	52,929	52,246	52,429	-500
Nuclear Export Controls	33,134	32,710	34,134	+1,000
Nuclear Verification	29,273	28,893	32,273	+3,000
Nonproliferation Policy	14,867	14,677	10,867	-4,000
Total, Nonproliferation and Arms Control	**130,203**	**128,526**	**129,703**	**-500**

* The FY 2017 Annualized CR amounts reflect the P.L. 114-254 continuing resolution level annualized to a full year. These amounts are shown only at the congressional control level and above, below that level, a dash (-) is shown.

Nonproliferation and Arms Control
Explanation of Major Changes
(Dollars in Thousands)

	FY 2018 vs FY 2016
Nonproliferation and Arms Control	**-500**
International Nuclear Safeguards: Decrease reflects completion of project to upgrade the IAEA's Additional Protocol Reporter software.	
Nuclear Export Controls: Increase supports technical end use and end user reviews of proposed U.S. exports of nuclear and dual-use items and technologies, and reviews of proposed exports under the JCPOA Procurement Channel.	**+1,000**
Nuclear Verification: Increase is for enhanced training and deployment readiness of the U.S. Uranium and Plutonium Verification Teams required to verify disablement, dismantlement, or other negotiated nonproliferation activities in foreign nuclear fuel cycle facilities.	**+3,000**
Nonproliferation Policy: Decrease primarily reflects a return to baseline funding following the one-time increase of $3.5M over the baseline provided by Congress in the FY2016 budget for improvements in the 10 CFR Part 810 export control process.	**-4,000**
Total, Nonproliferation and Arms Control	**-500**

Nonproliferation and Arms Control
International Nuclear Safeguards

Description

The International Nuclear Safeguards (NS) subprogram strengthens the international nuclear safeguards regime and the IAEA's ability to detect non-compliance. NS manages the Next Generation Safeguards Initiative (NGSI), oversees support for the U.S. Support Program (USSP) to IAEA Safeguards, collaborates with the IAEA and other partners to enhance the implementation of safeguards norms and best practices, oversees implementation of U.S. Additional Protocol (AP) and Voluntary Offer Agreement (VOA) safeguards activities at DOE sites and facilities, and assesses the physical protection of U.S.-obligated nuclear materials overseas. NS also provides support to the IAEA to monitor compliance with the JCPOA.

International Nuclear Safeguards

Activities and Explanation of Changes

FY 2016 Enacted	FY 2018 Request	Explanation of Changes FY 2018 vs FY 2016
International Nuclear Safeguards $52,929,000	**International Nuclear Safeguards $52,429,000**	**International Nuclear Safeguards -$500,000**
• Implemented U.S.-IAEA safeguards obligations at DOE facilities including annual reporting requirements as required by U.S. laws and treaty obligations. • Strengthened the international safeguards regime through the implementation of the State Level Concept with a focus on identifying and responding to specific technical, methodological and diplomatic barriers to implementation as they arise. • Demonstrated and transferred new technologies designed to enhance inspector capabilities in high-priority areas such as in-field analysis and detection of undeclared activities at declared facilities. • Tested spent fuel non-destructive assay technologies with foreign partners. • Demonstrated proof-of-concept for a global identification and monitoring system of uranium hexafluoride (UF6) cylinders; continued field testing and finalizing advanced safeguards concepts for Gas Centrifuge Enrichment Plants (GCEPs) for transfer to the IAEA; pursued promising cost-effective safeguards approaches for declared nuclear facilities; developed an integrated safeguards concept for electrochemical processing based on R&D conducted with international partners; and promoted Safeguards by Design as a standard industry practice.	• Implement U.S.-IAEA safeguards obligations at DOE facilities including annual reporting requirements as required by U.S. laws and treaty obligations. • Provide technical and technology assistance to the IAEA to monitor compliance with the JCPOA. • Cooperate with Department of State, Department of Defense, the Nuclear Regulatory Agency and the IAEA to develop guidelines and policies to help prioritize the allocation of limited safeguards resources in ways that will strengthen the IAEA's ability to detect, deter, and investigate undeclared nuclear activities. • Develop safeguards, concepts, and approaches for new facilities and fuel cycles; promote Safeguards by Design directly with designers and industry; analyze the implications of emerging technology to international safeguards applications. • Establish a safeguards experimental laboratory at a U.S. nuclear facility to serve as a safeguards training and education center for U.S. Government staff and graduate students and a proving ground for nascent safeguards technologies and concepts. • Continue field testing advanced safeguards approaches for GCEPs for transfer to the IAEA. • Develop safeguards technologies to: (1) address electrochemical processing based on R&D conducted with international partners; (2) improve efficiencies of safeguards; and (3)	• Decrease reflects the completion of the project to upgrade the IAEA’s Additional Protocol Reporter software.

FY 2016 Enacted	FY 2018 Request	Explanation of Changes FY 2018 vs FY 2016
• Provided customized bilateral and regional trainings, consultations, and collaborative engagements to 46 countries to ensure effective implementation of Comprehensive Safeguards Agreements and Additional Protocols. • Partnered with the IAEA and advanced nuclear partners to conduct joint nuclear safeguards outreach to existing partner countries and additional "nuclear newcomer" states. • Maintained qualified and knowledgeable safeguards staff at the U.S. National Laboratories and IAEA through curriculum development, internships and post-grad research positions, and short courses on safeguards. • Led seven U.S. Government assessments of the physical protection of U.S.-obligated nuclear materials at foreign facilities.	enhance inspector capabilities in high-priority areas such as enhanced in-field collection analysis and detection of undeclared activities at declared facilities. • Maintain qualified and knowledgeable safeguards staff at the U.S. National Laboratories and IAEA through nonproliferation curriculum development in nuclear engineering programs, internships and post-graduate research positions at U.S. National Laboratories, and safeguards training courses. • Transfer 5 safeguards tools to foreign partners or international organization to meet identified safeguards deficiencies. • Maintain support for accredited IAEA Network of Analytical Laboratories (NWAL) at U.S. National Laboratories. • Partner with the IAEA and advanced nuclear partners to field test advanced safeguards technologies to enhance state declarations and optimize safeguards resource allocations. • Promote universal adherence to IAEA safeguards agreements and good practices in safeguards implementation by providing customized training and outreach to more than 35 countries. • Lead 6 - 8 U.S. Government assessments of the physical protection of U.S.-obligated nuclear materials at foreign facilities.	

Description

The Nuclear Export Controls (NC) subprogram facilitates peaceful nuclear cooperation by strengthening domestic and global capacity to detect and prevent the illicit transfer of nuclear and dual-use materials, equipment, and technology. NC implements and oversees programs that: provide technical and end-user evaluations of U.S. export license applications; provide technical support to enhance U.S. Government capacity to detect and interdict illicit nuclear and dual-use commodity technology transfers to foreign programs of concern; provide technical support to the multilateral nonproliferation export control regimes; and strengthen foreign partner national systems of export control in coordination and consistent with U.S. policy and the multilateral supplier regimes.

Nuclear Export Controls

Activities and Explanation of Changes

FY 2016 Enacted	FY 2018 Request	Explanation of Changes FY 2018 vs FY 2016
Nuclear Export Controls $33,134,000	**Nuclear Export Controls $34,134,000**	**Nuclear Export Controls +$1,000,000**
• Engaged 35 foreign partners to strengthen national systems of export control and prevent illicit trafficking in Weapons of Mass Destruction (WMD) commodities through export licensing and enforcement training programs. • Trained U.S. export enforcement officials in partnership with the Export Enforcement Coordination Center (E2C2) established under the Export Control Reform Initiative and collaborate with the U.S. Customs and Border Protection's (CBP) National Targeting Center. • Performed 5,973 technical reviews of U.S. export licenses for nuclear and dual-use commodities, provided state-of-the-art technology assessments to the multilateral control regimes, and provided training courses for DOE and U.S. Government officials regarding changing export controlled technologies and proliferation concerns. • Provided 3,053 real-time technical interdiction case analyses, and provided unique analytical products regarding proliferation trends and commodity gaps through the Interdiction Technical Analysis Group and in support of the U.S. Government enforcement community.	• Engage 25-35 foreign partners to strengthen national systems of export control and prevent illicit trafficking in WMD-related commodities through export licensing and enforcement training programs, as part of the International Nonproliferation Export Control Program (INECP). • Train U.S. export enforcement officials in partnership with the E2C2 established under the Export Control Reform Initiative and collaborate with the CBP's National Targeting Center. • Perform approximately 6,000 technical reviews of U.S. export licenses for nuclear and dual-use commodities, provide state-of-the-art technology assessments to the multilateral control regimes, and provide training courses for DOE and U.S. Government officials regarding changing export controlled technologies and proliferation concerns. • Support the U.S. Government enforcement community by providing approximately 3,000 real-time technical analyses for interdiction cases per year and unique analytical products regarding proliferation trends and commodity gaps through the Interdiction Technical Analysis Group. • Maintain and support information technology systems to support export control licensing, interdiction analysis, and the multilateral nonproliferation export control regimes. • Provide technical review of proposed transfers of items, materials, goods, and technology to	• Increase support technical end use and end user reviews of proposed U.S. exports of nuclear and dual-use items and technologies, and reviews of proposed exports under the JCPOA Procurement Channel.

FY 2016 Enacted	FY 2018 Request	Explanation of Changes FY 2018 vs FY 2016
	Iran under the Procurement Working Group (PWG) of the JCPOA and develop an information technology tracking system for all such requests.	

Description

The Nuclear Verification (NV) subprogram reduces and eliminates proliferation concerns by enabling transparent arms reductions, including support for negotiation and implementation of U.S. nonproliferation and arms control treaties and agreements. The NV subprogram conducts applied technology development, testing, evaluation, and deployment of monitoring technologies and develops verification approaches including analysis of the impact of initiatives on DOE and NNSA sites. Additionally, the NV subprogram maintains technical readiness to negotiate and implement future nuclear fuel cycle transparency agreements and conducts U.S.-led missions to monitor and verify, dismantle, and disable proliferant nuclear fuel cycle programs around the world. The subprogram performs monitoring activities under existing agreements and supports U.S. Government review of other countries' compliance with their treaty and agreement obligations. The subprogram also contributes to U.S. policy development of treaty and agreement implementation while ensuring the U.S. requirements for maintaining a safe, secure, and reliable nuclear weapons stockpile are met.

Nuclear Verification

Activities and Explanation of Changes

FY 2016 Enacted	FY 2018 Request	Explanation of Changes FY 2018 vs FY 2016
Nuclear Verification $29,273,000	**Nuclear Verification $32,273,000**	**Nuclear Verification +$3,000,000**
• Developed advanced technologies and concepts for future warhead and fissile material transparency and verification regimes, including for implementation of the New START Treaty, and prepared DOE and NNSA sites for the implementation of such initiatives. • Collaborated with the United Kingdom under the 1958 Mutual Defense Agreement and other partner countries to develop potential common approaches to verification issues. • Conducted 3 monitoring visits in Russia under the terms of the U.S.-Russia Plutonium Production Reactor Agreement (PPRA) to ensure that Russian plutonium oxide is stored securely and that shutdown Russian plutonium production reactors remain in a non-operational status. • Continued activities related to nuclear testing limitations, including those that support monitoring and verification capabilities under the Comprehensive Nuclear-Test-Ban Treaty (CTBT). • Under the Seismic Cooperation Program, provided capacity-building training in seismology to foreign partner institutions to enhance their abilities to detect and analyze possible nuclear explosions, as well as mitigate geophysical hazards. • Maintained accreditation of the Organization for the Prevention of Chemical Weapons (OPCW) laboratory at Lawrence Livermore National Laboratory (LLNL).	• Develop advanced technical capabilities for warhead and fissile material monitoring and verification regimes, including for implementation of the New START Treaty, and prepare DOE and NNSA sites for the implementation of such initiatives. • Collaborate with the United Kingdom under the 1958 Mutual Defense Agreement and other partner countries to develop potential common approaches to verification issues. • Conduct 3 monitoring visits in Russia under the terms of the PPRA to ensure that Russian plutonium oxide is stored securely and that shutdown Russian plutonium production reactors remain in a non-operational status. Host Russian monitors on annual PPRA monitoring visit to shutdown U.S. plutonium production reactors at the Savannah River and Hanford Sites. • Continue activities related to nuclear testing limitations, including those that support monitoring and verification capabilities under the CTBT and International Monitoring System that complement and may strengthen U.S. nuclear explosion monitoring and verification capabilities. • Under the Seismic Cooperation Program, provide capacity-building training in seismology to foreign partner institutions to enhance their abilities to detect and analyze possible nuclear explosions, as well as mitigate geophysical hazards.	• Increase reflects enhanced Uranium and Plutonium Verification Team preparedness, including additional team exercises and simulations in foreign nuclear fuel cycle facilities. • Increase reflects improved Verification Team deployment readiness by refining technical objectives and implementation techniques in a variety of potential deployment scenarios.

FY 2016 Enacted	FY 2018 Request	Explanation of Changes FY 2018 vs FY 2016
• Provided operations planning and maintained short-notice readiness of technologies and capabilities to support U.S.-led verifiable monitoring and dismantlement of nuclear programs in countries of proliferation. • Developed, tested, and evaluated verification procedures and technologies for the dismantlement of uranium and plutonium fuel cycle activities in countries of proliferation concern. • Continued work on U.S. low enriched uranium processing data and forms. • Under the terms of the 1993 U.S.-Russia Highly Enriched Uranium Purchase Agreement, supported Russian monitoring visits to U.S. nuclear fuel fabrication facilities.	• Provide operations planning and maintain short-notice readiness of technologies and capabilities to support U.S.-led nuclear fuel cycle monitoring and verification missions around the world. • Develop, test, and evaluate verification procedures and technologies for U.S.-led verifiable monitoring and dismantlement of nuclear programs in countries of concern. • Train and exercise specialized U.S. verification teams for short-notice deployments to monitor and verify nuclear fuel cycle programs around the world. • Implement DOE obligations under the Chemical Weapons Convention, including maintaining accreditation of the OPCW laboratory at LLNL.	

Nonproliferation and Arms Control
Nonproliferation Policy

Description

The Nonproliferation Policy (NP) subprogram develops and implements programs, strategies, and policies to address enduring and emerging nonproliferation challenges and opportunities. NP supports the negotiation and implementation of nonproliferation agreements and requirements set forth in the Atomic Energy Act of 1954, as amended, and stemming from national nonproliferation initiatives, agreements, and treaties. In addition, the NP subprogram provides DOE/NNSA nonproliferation policy guidance on nuclear technology transfer and nuclear fuel cycle issues, undertakes activities to improve and update multilateral nuclear supplier arrangements, and identifies supplier vulnerabilities and potential gaps in supplier arrangements, including specific analysis and implementation of 10 CFR Part 810 – Assistance to Foreign Atomic Energy Activities. The Part 810 regulations implement section 57 b (2) of the Atomic Energy Act of 1954, as amended by section 302 of the Nuclear Nonproliferation Act of 1978, and control the export of unclassified nuclear technology and assistance. These regulations enable civil nuclear trade by ensuring that nuclear technologies and assistance exported from the U.S. will be used for peaceful purposes. Finally, the NP subprogram supports a small program focused on reducing the danger of nuclear war and preventing the spread of nuclear weapons in critical regions.

Nonproliferation Policy

Activities and Explanation of Changes

FY 2016 Enacted	FY 2018 Request	Explanation of Changes FY 2018 vs FY 2016
Nonproliferation Policy $14,867,000	**Nonproliferation Policy $10,867,000**	**Nonproliferation Policy -$4,000,000**
• Provided technical assistance to the negotiation of two Section 123 Agreements for Cooperation and their administrative arrangements. • Worked with the 48 governments of the Nuclear Suppliers Group (NSG) to strengthen controls on nuclear technology transfers, including amending the NSG Guidelines and ensuring the NSG control lists remain up to date with advancing technologies. • Supported implementation of the concept of industry self-regulation within the NSG Guidelines. • Maintained the NSG Information-Sharing System (NISS) and the NISS Forum, which helped coordinate work undertaken under the NSG Technical Experts Group (TEG). • Completed comprehensive update of the NSG Trigger List and Dual Use Annex Handbooks by December 2015. • Processed 50 Part 810 specific authorization applications and requests for amendments, including the provision of end-use and technical reviews. Reviewed specific authorization reports and notification to ensure activities comply with Part 810 and fall within the scope of the existing license. • Reviewed 460 Part 810 general authorization reports for compliance with Part 810 regulations and respond to requests for determination. • Implemented an e-licensing system to standardize the Part 810 licensing process.	• Provide technical assistance to the negotiation of up to three Section 123 Agreements for Cooperation and their administrative arrangements. • Continue work with the 48-member NSG to strengthen controls on nuclear technology transfers, including amending the NSG Guidelines and ensuring the NSG control lists remain up to date with advancing technologies. • Implement the new NSG Information-Sharing System (NISS) and the NISS Forum and conclude work on and deploy version 1.0 of the NISS app. • Process 40-50 Part 810 specific authorization applications and requests for amendments, including end-use and technical reviews. Review specific authorization reports and notification for compliance with Part 810 and the scope of the existing license. • Review over 100 Part 810 general authorization reports for compliance with Part 810 regulations and respond to requests for determination. • Fully implement all e-810 updates for Phase II and all Part 810 Process Improvement procedures. • Conduct analyses of the impact of NPT-related developments, and Nuclear Weapons Ban Treaty developments on NNSA weapons and nonproliferation work and promote DOE/NNSA interests in NPT. • Consider implications for DOE/NNSA complex of a potential FMCT verification regime.	• Decrease primarily reflects a return to baseline funding following the one-time increase of $3.5M over the baseline provided by Congress in the FY2016 budget for improvements in the export control process.

FY 2016 Enacted	FY 2018 Request	Explanation of Changes FY 2018 vs FY 2016
• Conducted analyses of the impact of Nonproliferation Treaty (NPT)-related developments on NNSA weapons and nonproliferation work and promote U.S. interests in the NPT. • Prepared DOE/NNSA complex for potential Fissile Material Cut-off Treaty verification. • Expanded cooperation with P3 and P5 countries on fissile material transparency. • Conducted Track 1.5 engagements in India, Pakistan, China, and Burma and leveraged these efforts to build capacity for greater regional and government-to-government cooperation in arms control, nonproliferation, and disarmament issues.	• Conduct Track 1.5 engagements with India, Pakistan, Saudi Arabia, Egypt, Turkey, Burma, and China, and leverage these efforts to build U.S. engagement and influence in nonproliferation and regional stability. • Grow South Asia-focused social media and web presence to promote U.S. nonproliferation priorities in the region.	

Nonproliferation and Arms Control
Performance Measures

In accordance with the GPRA Modernization Act of 2010, the Department sets targets for, and tracks progress toward, achieving performance goals for each program.

	FY 2016	FY 2017	FY 2018
Performance Goal (Measure)	**International Nonproliferation Export Control Program -** Cumulative number of countries where International Nonproliferation Export Control Program (INECP) is engaged that have export control systems that meet critical requirements.		
Target	36 countries	37 countries	38 countries
Result	Met - 36	TBD	TBD
Endpoint Target	By the end of FY 2025, 45 countries where INECP is engaged will have export control systems that meet critical requirements, defined as having: (1) control lists consistent with the WMD regimes; (2) initiated outreach to producers of WMD-related commodities; (3) developed links between technical experts and license reviewers and front-line enforcement officers; and (4) begun customization of educational materials and technical guides.		
Performance Goal (Measure)	**Reduce Nuclear Terrorism Threat -** In order to reduce the threat of nuclear terrorism, evaluate the physical security of U.S. obligated nuclear material located at foreign facilities by conducting bilateral physical security assessment reviews designed to evaluate the adequacy of existing security measures and provide recommendations for enhancing security if necessary.		
Target	6 assessments	6 assessments	6 assessments
Result	Met - 7	TBD	TBD
Endpoint Target	Annually review the physical security of U.S.-obligated nuclear material located at foreign facilities in order to reduce the threat of nuclear terrorism.		
Performance Goal (Measure)	**Safeguards Tools -** Annual number of safeguards tools transferred and used in international regimes and other countries that address an identified safeguards deficiency.		
Target	5 tools	5 tools	5 tools
Result	Met - 5	TBD	TBD
Endpoint Target	Annually transfer tools to international regimes and other countries to address identified safeguards deficiencies.		

Defense Nuclear Nonproliferation Research and Development

Overview

The FY 2018 Defense Nuclear Nonproliferation Research and Development (DNN R&D) program directly contributes to nuclear security by developing capabilities to detect and characterize global nuclear security threats. The DNN R&D program also supports cross-cutting functions and foundational capabilities across nonproliferation, counterterrorism, and emergency response mission areas. Specifically, the DNN R&D program makes these strategic contributions through the innovation of U.S. technical capabilities to detect, identify, locate, and characterize: 1) foreign nuclear material production and weapons development activities; 2) movement and illicit diversion of special nuclear materials; and 3) global nuclear detonations.

To meet national and Departmental nuclear security requirements, DNN R&D leverages the unique facilities and scientific skills of DOE, academia, and industry to perform research and demonstrate advances in capabilities, develop prototypes, and produce sensors for integration into operational systems.

Highlights of the FY 2018 Budget Request

Discrete, multi-year DNN R&D goals to be achieved in FY 2018 include:

- Complete five-year metric for demonstrating improvements in U.S. detection and characterization capabilities of foreign nuclear weapons production activities;
- Complete five-year metric for demonstrating improvements in U.S. capabilities in nuclear weapons and material security, including SNM detection, warhead monitoring, chain-of-custody monitoring, and safeguards; and,
- Deliver nuclear detonation detection satellite payloads in accordance with the negotiated schedule with the United States Air Force (USAF).

DNN R&D will continue programmatic activities for nonproliferation and foreign weapons program activity monitoring through continued execution and development of national test beds for validation of new sensors, equipment, and capabilities. The DNN R&D program provides a broad, underlying set of technical capabilities that support nuclear nonproliferation and nuclear security, including those for addressing counterterrorism/incident response requirements. The program will also support the payload-side technical integration, pre-launch, and on-orbit testing activities for previously delivered payloads in accordance with host satellite schedules. The DNN R&D program will continue to align with the developing interagency requirements for early detection of nuclear proliferation, including low-yield nuclear explosion monitoring, SNM production, and cross-cutting data science. Finally, DNN R&D will conduct research in seismic, radionuclide, and detonation forensics, at lower nuclear yield levels, to support national capability in terrestrial and airborne monitoring and analysis methods.

Defense Nuclear Nonproliferation Research and Development (DNN R&D)
Funding

(Dollars in Thousands)

	FY 2016 Enacted	FY 2017 Annualized CR*	FY 2018 Request	FY 2018 vs FY 2016
Defense Nuclear Nonproliferation R&D				
Proliferation Detection	251,066	249,704	263,200	+12,134
Nuclear Detonation Detection	168,267	164,229	182,895	+14,628
SBIR/STTR (non-add)	7,801	8,929	9,627	+1,826
Total, Defense Nuclear Nonproliferation R&D	**419,333**	**413,933**	**446,095**	**+26,762**

* The FY 2017 Annualized CR amounts reflect the P.L. 114-254 continuing resolution level annualized to a full year. These amounts are shown only at the congressional control level and above, below that level, a dash (-) is shown.

Small Business Innovation Research (SBIR)/Small Business Technology Transfer (STTR):
- FY 2016 Transferred: SBIR: $6,784; STTR: $1,017
- FY 2017 Projected: SBIR: $7,828; STTR: $1,101
- FY 2018 Request: SBIR: $8,440; STTR: $1,187

Defense Nuclear Nonproliferation Research and Development
Explanation of Major Changes
(Dollars in Thousands)

	FY 2018 vs FY 2016
Defense Nuclear Nonproliferation Research and Development	
Proliferation Detection (PD): The increase reflects baseline funding to complete five-year metrics in detecting nuclear weapons development activities and in nuclear weapons and material security, with special emphasis on addressing U.S. requirements for early detection of proliferation.	+12,134
Nuclear Detonation Detection (NDD): The increase reflects baseline funding to mitigate supply-chain interruptions and sensor integration costs in meeting schedule of deliveries of space-based sensors to USAF.	+14,628
Total, Defense Nuclear Nonproliferation Research and Development	**+26,762**

Description

The Proliferation Detection (PD) R&D subprogram develops technologies to: detect foreign nuclear weapons programs; support nuclear arms control treaty verification by improving compliance monitoring capabilities; and supports national nuclear security, nuclear counterterrorism, incident response, and interdiction of nuclear materials outside of regulatory control. PD efforts are aligned along these major functional areas: (1) Nuclear Weapons Development and Material Production Detection efforts targeted towards the detection, identification, location, and characterization of foreign nuclear weapons program activities; (2) Nuclear Weapons and Material Security efforts targeted toward nuclear security and nuclear arms control treaty monitoring and verification tools and applications, operational interdiction, radiological source replacement, and nuclear security efforts across NNSA; and (3) Nonproliferation Enabling Capabilities efforts supporting a broad R&D base to bring new, cross-cutting technologies to multi-use applications across NNSA and the interagency community including a field experiment and demonstration program and university research program. The field demonstration program integrates research and experimental test bed activities to advance technology in support of the Nation's treaty verification and monitoring needs. This R&D sub-program also supports the nuclear counterterrorism and incident response mission area. PD's university program is comprised of three consortia which link universities and DOE national laboratories to address basic research gaps in nuclear nonproliferation and security and treaty compliance monitoring.

Proliferation Detection

Activities and Explanation of Changes

FY 2016 Enacted	FY 2018 Request	Explanation of Changes FY 2018 vs FY 2016
Proliferation Detection $251,066,000	**Proliferation Detection $263,200,000**	**Proliferation Detection +$12,134,000**
• Provided advanced sensor and algorithm development around operational testing at the sensor development test bed; achieved 2016 goals to demonstrate technologies and methods for foreign uranium production detection; and demonstrated capability to persistently and remotely monitor nuclear material processing facilities. • Achieved 2016 goal to demonstrate the End-to-End campaign's initial warhead monitoring and chain-of-custody capabilities in support of new arms control commitments; achieved 2016 initiative to demonstrate remote monitoring capabilities for reactor operations. • Prepared first nuclear explosion monitoring experiment for seismic source physics in the third (and most geologically complex) of three planned test beds, as per long-term test plan; supported the NNSA's portion of the Integrated University Program to address basic gaps in nuclear nonproliferation and treaty compliance monitoring research. • Provided nuclear and energetic materials characterization data to meet requirements of Nuclear Counterterrorism and Incident Response (NCTIR) programs.	• Strengthen U.S. capabilities to detect and characterize foreign nuclear programs, especially in denied areas as follows: Advance sensor and algorithm development and demonstrate technologies and methods in operational test bed environments for SNM production detection; advance stand-off detection methods for weaponization activities to monitor the potential technical breakout of foreign weapons programs; innovate new analytic approaches to move proliferation detection to earlier timelines and close information gaps in denied areas. • Advance U.S. capabilities to strengthen nuclear security across the threat spectrum as follows: Advance detection and imaging for SNM detection, weapons monitoring, search, interdiction, and incident response, including device diagnostics and stabilization tools with improved understanding of improvised nuclear device performance; address nuclear data gaps in support of nuclear security. • Develop new technologies and methods to detect, identify, locate, and characterize nuclear explosions as follows: Execute phase II of seismic source physics experiments; advance low yield nuclear explosion monitoring through development of new signatures, local sensors, and dynamic network analysis; complete underground nuclear explosion signatures experiment addressing non-prompt and persistent nuclear testing signatures.	• Increase reflects baseline funding to complete five-year metrics in detecting nuclear weapons development activities and in nuclear weapons and material security, with special emphasis on addressing U.S. requirements for early detection of proliferation.

FY 2016 Enacted	FY 2018 Request	Explanation of Changes FY 2018 vs FY 2016
	• Support the NNSA's portion of the Integrated University Program to address basic gaps in nuclear nonproliferation and treaty compliance monitoring.	

Defense Nuclear Nonproliferation Research and Development
Nuclear Detonation Detection

Description

The Nuclear Detonation Detection (NDD) subprogram develops and builds space sensors for the nation's operational nuclear test treaty monitoring and Integrated Threat Warning/Attack Assessment capabilities; conducts R&D to advance analytic forensic capabilities related to nuclear detonations and interdicted samples; and produces and updates the regional geophysical datasets and analytical understanding of waveform and radionuclide signatures to enable operation of the nation's ground-based nuclear detonation monitoring networks.

Nuclear Detonation Detection

Activities and Explanation of Changes

FY 2016 Enacted	FY 2018 Request	Explanation of Changes FY 2018 vs FY 2016
Nuclear Detonation Detection $168,267,000	**Nuclear Detonation Detection $182,895,000**	**Nuclear Detonation Detection $+14,628,000**
• Delivered Global Burst Detector (GBD) nuclear detonation detection payloads for Global Positioning System (GPS) block III satellites in accordance with the negotiated schedule with USAF. Supported payload-side technical integration, pre-launch and on-orbit testing activities for previously delivered payloads. Continued development and production of a treaty monitoring focused payload. Continued required engineering development work and satellite interface coordination to support payload design update for subsequent satellite blocks for GBDs and treaty monitoring focused payloads. • Continued baseline schedule for advancing research, technology development, and related science to improve pre- and post-detonation technical nuclear forensic capabilities. Continued to develop and test technical means to assess recent origins of bulk samples of SNM. • Provided research products with appropriate testing, demonstration, verification, validation, and technical support for use in the U.S. National Data Center and U.S. Atomic Energy Detection System. Continued to integrate products of source physics experiments and other field and laboratory test campaigns into methods to improve event discrimination. Developed analytical improvements that enable sustained level of performance with reduced operator time.	• Deliver additional GBD nuclear detonation detection payloads for GPS block III satellites in accordance with the negotiated schedule with the USAF. Support payload-side technical integration, pre-launch, and on-orbit testing activities for previously delivered payloads. Continues development and production of sensor-laden payloads for launch into geosynchronous orbit. Continue required engineering development work and satellite interface coordination to support payload design updates for future satellite blocks for GBDs and other U.S. Nuclear Detonation Detection System payloads. • Improve pre- and post-detonation technical nuclear forensic capabilities, including the technical means to assess bulk samples of SNM. Address research priorities that undergird the technical capability of operational assets. • Improve capabilities of geophysical models of seismic signals from underground detonations and improve technologies to detect radionuclide releases, including integrating products of field and laboratory test campaigns into methods to improve event discrimination.	• The increase reflects baseline funding to mitigate supply-chain interruptions and sensor integration costs to effectively meet schedule of deliveries of space-based sensors to the USAF.

Defense Nuclear Nonproliferation Research and Development
Performance Measures

In accordance with the GPRA Modernization Act of 2010, the Department sets targets for, and tracks progress toward, achieving performance goals for each program.

	FY 2016	FY 2017	FY 2018
Performance Goal (Measure)	**Nuclear Detonation Detection -** Annual index that summarizes the status of all NNSA nuclear detonation detection R&D deliveries that improve the nation's ability to detect nuclear detonations.		
Target	90 % index	90 % index	90 % index
Result	Met - 90	TBD	TBD
Endpoint Target	Annually achieve timely delivery of NNSA nuclear detonation detection products. (90% target reflects good on-time delivery. Index considers factors beyond NNSA’s control and impact on customer schedules.)		
Performance Goal (Measure)	**Nuclear Weaponization and Material Production Detection -** Cumulative percentage of progress toward demonstrating improvements in detection and characterization capabilities of nuclear weapons production activities.		
Target	70 % of progress	90 % of progress	100 % of progress
Result	Met - 70	TBD	TBD
Endpoint Target	By the end of FY 2018, achieve 100% cumulative progress toward demonstrating new capabilities detecting uranium and plutonium production and nuclear weaponization processes.		
Performance Goal (Measure)	**Nuclear Weapons and Material Security -** The cumulative percentage of progress towards demonstrating improvements in Special Nuclear Material detection, warhead monitoring, chain-of-custody monitoring, safeguards, and characterization capabilities.		
Target	70 % of progress	90 % of progress	100 % of progress
Result	Met - 70	TBD	TBD
Endpoint Target	By the end of FY 2018, achieve 100% cumulative progress toward demonstrating new capabilities for warhead monitoring, warhead chain-of-custody, Special Nuclear Material movement detection, and nuclear safeguards.		
Performance Goal (Measure)	**Uranium-235 Production Detection -** Cumulative percentage of progress toward demonstrating the next generation of technologies and methods to detect uranium-235 enrichment activities. (Progress is measured against the baseline criteria and milestones published in the “FY 2006 R&D Requirements Document”.)		
Target	100 % of progress	N/A	N/A
Result	Met - 100	TBD	TBD

Defense Nuclear Nonproliferation Research and Development
Capital Summary

(Dollars in Thousands)

	Total	Prior Years	FY 2016 Enacted	FY 2016 Current	FY 2017 Annualized CR*	FY 2018 Request	FY 2018 vs FY 2016
Capital Operating Expenses Summary (including Major Items of Equipment (MIE))							
Capital Equipment >$500K (including MIE)	N/A	N/A	50,606	50,606	51,719	52,857	+2,251
Plant Projects (GPP and IGPP)	N/A	N/A	0	0	0	0	0
Total, Capital Operating Expenses	**N/A**	**N/A**	**50,606**	**50,606**	**51,719**	**52,857**	**+2,251**
Capital Equipment > $500K (including MIE)							
Total Non-MIE Capital Equipment	N/A	N/A	50,606	50,606	51,719	52,857	+2,251
Total, Capital Equipment (including MIE)	**N/A**	**N/A**	**50,606**	**50,606**	**51,719**	**52,857**	**+2,251**
Plant Projects (GPP and IGPP)							
Total Plant Projects (GPP/IGPP) (Total Estimated Cost (TEC) <$5M)	N/A	N/A	0	0	0	0	0
Total, Plant Projects (GPP/IGPP)	**N/A**	**N/A**	**0**	**0**	**0**	**0**	**0**
Total, Capital Summary	**N/A**	**N/A**	**50,606**	**50,606**	**51,719**	**52,857**	**+2,251**

* The FY 2017 Annualized CR amounts reflect the P.L. 114-254 continuing resolution level annualized to a full year. These amounts are shown only at the congressional control level and above, below that level, a dash (-) is shown.

Nonproliferation Construction

Overview

The Nonproliferation Construction Program consolidates construction projects that directly contribute to reducing global nuclear security threats and is a key component of DOE/NNSA's integrated nonproliferation, counterterrorism, and emergency response strategies.

Highlights of the FY 2018 Budget Request

In FY 2018, the Administration proposes to terminate the Mixed Oxide Fuel Fabrication (MFFF) project and pursue a dilute and dispose strategy to fulfill the United States' commitment to dispose of 34 metric tons of plutonium. The dilute and dispose strategy consists of blending plutonium with an inert mixture, packaging for safe storage and transport, and disposing of it in a geologic repository.

Nonproliferation Construction
Funding

	(Dollars in Thousands)			
	FY 2016 Enacted	**FY 2017 Annualized CR***	**FY 2018 Request**	**FY 2018 vs FY 2016**
Nonproliferation Construction				
U.S. Construction				
18-D-150, Surplus Plutonium Disposition (SPD) Project				
SPD Other Project Costs (OPC)	0	0	4,000	+4,000
SPD Total Estimated Cost (TEC)	0	0	5,000	+5,000
Subtotal, 18-D-150, Surplus Plutonium Disposition (SPD) Project	**0**	**0**	**9,000**	**+9,000**
99-D-143 Mixed Oxide (MOX) Fuel Fabrication Facility, SRS				
MFFF Other Project Costs (OPC)	10,000	5,622	15,000	+5,000
MFFF Total Estimated Cost (TEC)	330,000	330,000	255,000	-75,000
Subtotal, 99-D-143 Mixed Oxide (MOX) Fuel Fabrication Facility, SRS	**340,000**	**335,622**	**270,000**	**-70,000**
Subtotal, U.S. Construction	**340,000**	**335,622**	**279,000**	**-61,000**
Total, Nonproliferation Construction	**340,000**	**335,622**	**279,000**	**-61,000**

* The FY 2017 Annualized CR amounts reflect the P.L. 114-254 continuing resolution level annualized to a full year. These amounts are shown only at the congressional control level and above, below that level, a dash (-) is shown.

Nonproliferation Construction Projects
Explanation of Major Changes
(Dollars in Thousands)

	FY 2018 vs FY 2016
Nonproliferation Construction Projects	
U.S. Construction:	
18-D-150, Surplus Plutonium Disposition (SPD) Project: The increase reflects the addition of a new line item project for the dilute and dispose strategy to support preliminary design upon completion of CD-1, Approve Alternative Selection and Cost Range.	+$9,000
99-D-143, Mixed Oxide (MOX) Fuel Fabrication Facility: The decrease reflects the termination of the MFFF project.	-70,000
Total, Nonproliferation Construction Projects	**-61,000**

Nonproliferation Construction
U.S. Construction

Description

The current Nonproliferation Construction program is constructing the Mixed Oxide Fuel Fabrication (MFFF) facility to dispose of at least 34 metric tons (MT) of surplus U.S. weapon-grade plutonium by fabricating it into mixed oxide fuel and irradiating it in commercial nuclear reactors.

The Administration proposes to terminate the MFFF project and will pursue the dilute and dispose strategy to fulfill the United States' commitment to dispose of 34 metric tons of plutonium. The dilute and dispose strategy consists of blending plutonium with an inert mixture, packaging it for safe storage and transport, and disposing of it in a geologic repository.

The MFFF project cost has exceeded the 2008 TPC and has not been re-baselined. Since 2012, the Department has requested multiple independent cost estimates. The most recent performance baseline update was completed in 2016 by the DOE Office of Project Management Oversight in partnership with the U.S. Army Corps of Engineers (USACE). This update, determined reliable by the GAO, estimates a TPC of $17.2 billion and Critical Decision (CD)-4 occurring in FY 2048. DOE will request the MFFF prime contractor determine activities required to place the facility and project in a safe and secure state and wind down construction, design, support, and procurement efforts as quickly as possible to terminate the project in a cost effective manner. DOE will issue contract direction to MOX Services as early as practicable to halt construction activities and to develop a termination plan.

The Surplus Plutonium Disposition (SPD) Project proposed in the FY 2018 President's Budget Request supports the Dilute and Dispose (D&D) Capability. During FY 2016, pre-conceptual design was completed, and the Department confirmed the existing CD-0 milestone approving mission need for plutonium disposition would apply to the dilute and dispose strategy. During FY 2017 and 2018, an Analysis of Alternatives and conceptual design will be completed to support a CD-1 Approve Alternative Selection and Cost Range for the project.

Other Project Cost (OPC)

This activity supports all other costs related to a project that are not included in the total estimated cost (TEC). OPCs include, but are not limited to: research and development, conceptual design and conceptual design report, cold start-up and commissioning costs, NEPA documentation, project data sheet preparation, siting, and permitting requirements. These costs are part of the approved baseline and the total project cost (TPC) of the project.

Total Estimated Costs (TEC)

This activity supports the design, long-lead equipment procurement, site preparation, and construction of the project.

U.S. Construction

Activities and Explanation of Changes

FY 2016 Enacted	FY 2018 Request	Explanation of Changes FY 2018 vs FY 2016
U.S. Construction $340,000,000	**U.S. Construction $279,000,000**	**U.S. Construction -$61,000,000**
18-D-150, Surplus Plutonium Disposition (SPD) Project $0	**18-D-150, Surplus Plutonium Disposition (SPD) Project $9,000,000**	**18-D-150, Surplus Plutonium Disposition (SPD) Project +$9,000,000**
SPD OPC $0	***SPD OPC $4,000,000***	***SPD OPC +$4,000,000***
• No activity.	• Begin project and design support activities.	• The increase reflects the addition of a new line item project for the dilute and dispose strategy to support preliminary design upon completion of CD-1 - Approve Alternative Selection and Cost Range.
SPD TEC $0	***SPD TEC $5,000,000***	***SPD TEC +$5,000,000***
• No activity.	• Begin prelimary design.	• The increase reflects the addition of a new line item project for the dilute and dispose strategy to support preliminary design upon completion of CD-1- Approve Alternative Selection and Cost Range.
MOX Fuel Fabrication Facility (MFFF) $340,000,000	**MOX Fuel Fabrication Facility (MFFF) $270,000,000**	**MOX Fuel Fabrication Facility (MFFF) -$70,000,000**
MFFF OPC $10,000,000	***MFFF OPC $15,000,000***	***MFFF OPC +$5,000,000***
• Continue management oversight and licensing activities.	• Develop a termination plan with the contractor and begin implementation.	• The decrease reflects the termination of the MFFF project.
MFFF TEC $330,000,000	***MFFF TEC $255,000,000***	***MFFF TEC - $75,000,000***
• Continue management oversight and licensing activities.	• Develop a termination plan with the contractor and begin implementation.	• The decrease reflects the termination of the MFFF project.

Nonproliferation Construction
Performance Measures

In accordance with the GPRA Modernization Act of 2010, the Department sets targets for, and tracks progress toward, achieving performance goals for each program.

	FY 2016	FY 2017	FY 2018
Performance Goal (Measure)	**Mixed Oxide (MOX) Fuel Fabrication Facility -** Cumulative percentage of the design, construction, and cold start-up activities completed for the Mixed Oxide (MOX) Fuel Fabrication Facility.		
Target	TBD	N/A	N/A
Result	Data Not Available	TBD	TBD
Endpoint Target	Performance measure targets will be adjusted to reflect the decision of the path forward for plutonium disposition.		

Nonproliferation Construction
Construction Projects Summary

(Dollars in Thousands)

	Total	Prior Years	FY 2016 Enacted	FY 2017 Enacted	FY 2018 Request	FY 2018 vs FY 2017
DNN Construction						
18-D-150, Surplus Plutonium Disposition (SPD) Project						
Other Project Cost (OPC)	0	0	0	0	4,000	+4,000
Total Estimated Cost (TEC)	0	0	0	0	5,000	+5,000
Total, 18-D-150, SPD	**0**	**0**	**0**	**0**	**9,000**	**+9,000**
99-D-143, MOX Fuel Fabrication Facility (MFFF)						
Other Project Cost (OPC)	2,439,333	326,333	10,000	25,000	15,000	-10,000
Total Estimated Cost (TEC)	10,251,519	4,928,520	330,000	310,000	255,000	-55,000
Total, 99-D-143, MFFF	**12,690,852**	**5,254,853**	**340,000**	**335,000**	**270,000**	**-65,000**
Total, DNN Construction	**12,690,852**	**5,254,853**	**340,000**	**335,000**	**279,000**	**-56,000**

18-D-150, Surplus Plutonium Disposition (SPD)
Savannah River Site, Aiken, South Carolina
Project Data Sheet (PDS) is for Design and Construction

Significant Changes and Summary

Significant Changes

This Project Data Sheet (PDS) is new, being submitted for the first time, and does include a new start for the budget year. In FY 2017, $6 million of the $15 million appropriated for the dilute and dispose alternative will support the Surplus Plutonium Disposition (SPD) project. The remaining $9 million will support the development of the lifecycle cost estimate (LCCE) for the dilute and dispose program and supporting analysis.

Summary

The most recent Department of Energy (DOE) approved Critical Decision (CD) for the Surplus Plutonium Disposition (SPD) Line Item is CD-0[a], Approve Mission Need, was approved on October 31, 1997. The SPD Program mission need was to be implemented utilizing the Mixed Oxide (MOX) Fuel approach. In FY 2018, the Administration proposes to terminate the Mixed Oxide Fuel Fabrication (MFFF) project and will pursue the dilute and dispose strategy to fulfill the United States' commitment to dispose of 34 metric tons of plutonium.

The dilute and dispose strategy requires a capital asset, designated the SPD Project to accomplish the mission. The preliminary cost range for this project is $200 million to - $500 million, with CD-4 projected for FY 2026 to FY 2027.

A Federal Project Director has not been assigned to this project and has not approved this PDS. A Federal Project Director will be assigned to this project prior to CD-1.

The dilute and dispose strategy utilizes mature technologies currently in use at DOE facilities. However, in order to disposition 34 metric tons of plutonium in a timely manner, additional throughput capacity to dilute the plutonium oxide with an inhibitor material is required. The project will install new gloveboxes, associated process and process support equipment, security upgrades, and additional interim storage capacity for the diluted plutonium product until characterization, packaging, and shipment for final disposal.

As required by DOE Order 413.3B, an independent Analysis of Alternatives (AoA) has been completed. Based on the results, the Department Project Management Executive, with concurrence from the SPD AoA Steering Committee, selected the preferred location for the Project to be the K-Area Reactor Facility at the Savannah River Site (SRS), Aiken, South Carolina.

CD-1 is expected to be approved in the 3rd quarter of FY 2018. The TEC funds requested in FY 2018 will be used to begin preliminary design for the project.

FY 2017 Current Project Status:

During FY 2017, an independent AoA was completed, which considered numerous alternatives including the status quo. Based on the results of the analysis, the Department Project Management Executive, with concurrence from the SPD AoA Steering Committee, selected the preferred alternative to be located in the K-Area Facility at the SRS.

FY 2017 activities focused on the completion of the conceptual design to support the FY 2018 President's Budget Request for Project Engineering and Design (PED) funds. This included facility layout drawings and other engineering documentation

[a] The Department confirmed that the existing CD-0 milestone approving mission need for plutonium disposition would apply to the Surplus Plutonium Disposition (SPD) Project.

providing the basis for the Conceptual Design Report. Other documentation required for the CD-1 package is in development.

FY 2018 Description of Activities:

The FY 2018 scope includes preparing and submitting the CD-1 package for approval, expected in the 3rd Quarter of FY 2018. The approval process will include an Independent Project Review (IPR), Independent Cost Estimate (ICE), and Independent Technical Review (ITR) as required by DOE Order 413.3B. FY 2018 work also includes initiation of the preliminary design for the project and completing design of the plutonium processing gloveboxes and associated equipment in order to initiate procurement of gloveboxes (shells and components, to include fabrication and assembly) in FY 2019.

The funding profile for future years will be updated when the estimates are validated and a baseline has been approved as part of the critical decision process. As a result, all funding estimates shown in this PDS are not validated.

Critical Milestone History
(fiscal quarter or date)

	CD-0	Conceptual Design Complete	CD-1	Final Design Complete	CD-2	CD-3	CD-4	D&D Start	D&D Complete
FY 2018[a]	10/31/1997	2/2/2017	3QFY2018	4QFY2021	1QFY2022	1QFY2022	4QFY2027	N/A	N/A

CD-0 – Approve Mission Need
Conceptual Design Complete – Actual date the conceptual design was completed
CD-1 – Approve Alternative Selection and Cost Range
Final Design Complete – Estimated date the project design will be completed
CD-2 – Approve Performance Baseline
CD-3 – Approve Start of Construction
CD-4 – Approve Start of Operations or Project Closeout
D&D Start – Start of Demolition & Decontamination (D&D) work
D&D Complete – Completion of D&D work

(fiscal quarter or date)

	Performance Baseline Validation	CD-3A
FY 2018[a]	1QFY2022	1QFY2019

CD-3A – Long Lead procurement for glove box and HEPA system components.

Project Cost History

(dollars in thousands)

	TEC, Design	TEC, Construction	TEC, Total	OPC Except D&D	OPC, D&D	OPC, Total	TPC
FY 2018 [a]	165,000	255,000	420,000	80,000	N/A	80,000	500,000

[a] The costs and schedules are only estimates and consistent with the high end of the cost range. No construction will be performed until the project performance baseline has been validated and CD-3 has been approved.

Project Scope and Justification

Scope

The SPD Project will implement the dilute and dispose strategy in the K-Area Facility at SRS. New gloveboxes and associated process and process support equipment for dilution of plutonium oxide will be provided in the K-Area Facility. Containers of plutonium oxide will be opened in the new gloveboxes; the oxide will be size reduced as necessary and then measured into a blend can to a prescribed amount. Inhibitor material will be added to the blend cans to dilute the plutonium oxide. The inhibitor is an inert powder mixture utilized to make the recovery of plutonium more difficult and allowing for the termination of safeguards. The blend cans will be mechanically manipulated to homogenize the content. The blend cans will be removed from the glovebox, assayed, and packaged into a Criticality Control Overpack (CCO). The project will install additional interim storage for the diluted plutonium product as well as characterization and packaging equipment to enable certification and shipment for final disposal.

Approximately 7,000 – 10,000 ft^2 of processing space in the existing Hazard Category 2 K-Area Facility and 45,000 - 60,000 ft^2 of interim storage and processing space will be required for the project. To increase dilution throughput capacity, gloveboxes, equipment, and support systems (i.e., glovebox ventilation, fire suppression, glovebox rooms with airlocks, material control and accountability equipment, monitoring equipment, lag storage, etc.) will be installed in the K-Area Facility.

Justification

The mission of the dilute and dispose strategy is to provide processing, characterization, and storage capabilities to efficiently disposition and permanently dispose of 34 metric tons of plutonium for eliminating excess nuclear weapons materials.

It is a Departmental priority to remove certain inventories of plutonium from the State of South Carolina. Therefore, expediting removal of plutonium from SRS for final disposition is a key objective of the program. Although the dilute and dispose strategy utilizes mature technologies currently in use at DOE facilities, additional capacity is required to increase throughput in order to disposition the required 34 metric tons of plutonium in a timely manner. The additional capacity will be provided by the SPD Project. The project will include new gloveboxes and associated process and process support equipment as well as additional interim storage capacity and security features for the diluted plutonium product until eventual characterization, packaging, and shipment for disposal.

A pre-conceptual risk analysis was completed to inform the cost range and another conducted during the AoA. A Risk Management Plan and a Risk and Opportunity Assessment Report will be included at CD-1. The contingency included in this data sheet is consistent with the criteria found in the Association for Advancement of Cost Engineering International recommended practices to be used for concept screening for a Class 5 estimate and DOE Cost Estimating Guide DOE G 413.3-21. The level of project definition for engineering is less than one percent complete.

The SPD project is being conducted in accordance with the project management requirements in DOE O 413.3B, Program and Project Management for the Acquisition of Capital Assets, and all appropriate project management requirements have been met.

The decision to implement the dilute and dispose strategy for the SPD Program would be made pursuant to the National Environmental Protection Act.

Financial Schedule[a]

	(dollars in thousands)		
	Appropriations	**Obligations**	**Costs**
Total Estimated Cost (TEC)			
Design			
FY 2017	0	0	0
FY 2018	5,000	5,000	5,000
FY 2019	22,000	22,000	22,000
FY 2020	43,000	43,000	43,000
FY 2021	51,000	51,000	51,000
FY 2022	44,000	44,000	44,000
FY 2023	0	0	0
FY 2024	0	0	0
FY 2025	0	0	0
FY 2026	0	0	0
FY 2027	0	0	0
Total, Design	**165,000**	**165,000**	**165,000**
Construction			
FY 2017	0	0	0
FY 2018	0	0	0
FY 2019 [b]	20,000	20,000	20,000
FY 2020	0	0	0
FY 2021	0	0	0
FY 2022	36,000	36,000	36,000
FY 2023	55,000	55,000	55,000
FY 2024	55,000	55,000	55,000
FY 2025	45,000	45,000	45,000
FY 2026	25,000	25,000	25,000
FY 2027	19,000	19,000	19,000
Total, Construction	**255,000**	**255,000**	**255,000**
Total Estimated Cost (TEC)			
FY 2017	0	0	0
FY 2018	5,000	5,000	5,000
FY 2019	42,000	42,000	42,000
FY 2020	43,000	43,000	43,000
FY 2021	51,000	51,000	51,000
FY 2022	80,000	80,000	80,000
FY 2023	55,000	55,000	55,000
FY 2024	55,000	55,000	55,000
FY 2025	45,000	45,000	45,000
FY 2026	25,000	25,000	25,000

[a] The costs and schedules are only estimates and consistent with the high end of the cost range. No construction will be performed until the project performance baseline has been validated and CD-3 has been approved.
[b] Includes funds for early procurement of Engineered Equipment.

	(dollars in thousands)		
	Appropriations	**Obligations**	**Costs**
FY 2027	19,000	19,000	19,000
Total TEC	**420,000**	**420,000**	**420,000**
Other Project Cost (OPC)			
OPC except D&D			
FY 2017	6,000	6,000	3,000
FY 2018	4,000	4,000	7,000
FY 2019	5,000	5,000	5,000
FY 2020	3,000	3,000	3,000
FY 2021	5,000	5,000	5,000
FY 2022	5,000	5,000	5,000
FY 2023	7,000	7,000	7,000
FY 2024	14,000	14,000	14,000
FY 2025	14,000	14,000	14,000
FY 2026	13,000	13,000	13,000
FY 2027	4,000	4,000	4,000
Total, OPC except D&D	**80,000**	**80,000**	**80,000**
D&D	N/A	N/A	N/A
FY			
Total, D&D	**N/A**	**N/A**	**N/A**
Total, OPC	**80,000**	**80,000**	**80,000**
Total Project Cost (TPC)			
FY 2017	6,000	6,000	3,000
FY 2018	9,000	9,000	12,000
FY 2019	47,000	47,000	47,000
FY 2020	46,000	46,000	46,000
FY 2021	56,000	56,000	56,000
FY 2022	85,000	85,000	85,000
FY 2023	62,000	62,000	62,000
FY 2024	69,000	69,000	69,000
FY 2025	59,000	59,000	59,000
FY 2026	38,000	38,000	38,000
FY 2027	23,000	23,000	23,000
Total, TPC	**500,000**	**500,000**	**500,000**

Details of Project Cost Estimate[a]

	(dollars in thousands)		
	Current Total Estimate [a]	**Previous Total Estimate**	**Original Validated Baseline**
Total Estimated Cost (TEC)			
Design			
Design	88,517	N/A	N/A
Contingency	76,483	N/A	N/A
Total, Design	**165,000**[b]	**N/A**	**N/A**
		N/A	N/A
Construction		N/A	N/A
Site Preparation	1,000	N/A	N/A
Long Lead Equipment	20,000	N/A	N/A
Equipment	17,000	N/A	N/A
Other Construction	134,413	N/A	N/A
Contingency	82,587	N/A	N/A
Total, Construction	**255,000**	**N/A**	**N/A**
		N/A	N/A
Total, TEC	**420,000**	**N/A**	**N/A**
Contingency, TEC	**159,070**	**N/A**	**N/A**
Other Project Cost (OPC)			
OPC except D&D			
Conceptual Planning	2,340	N/A	N/A
Conceptual Design	10,000	N/A	N/A
Start-Up	40,000	N/A	N/A
Contingency	27,660	N/A	N/A
Total, OPC except D&D	**80,000**	**N/A**	**N/A**
D&D			
D&D	N/A	N/A	N/A
Contingency	N/A	N/A	N/A
Total, D&D	**N/A**	**N/A**	**N/A**
Total, OPC	**80,000**	**N/A**	**N/A**
Contingency, OPC	**27,660**		
		N/A	**N/A**
Total, TPC	**500,000**	**N/A**	**N/A**
Total, Contingency	**186,730**	**N/A**	**N/A**

[a] The costs and schedules are only estimates and consistent with the high end of the cost range. No construction will be performed until the project performance baseline has been validated and CD-3 has been approved.
[b] For a typical nuclear construction project at SRS, design costs are roughly 40 percent of the TPC.

Schedule of Appropriation Requests (dollars in thousands)[a]

Request Year		Prior Years	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	Outyears	Total
FY 2018	TEC	0	5,000	42,000	43,000	51,000	80,000	199,000	420,000
	OPC	6,000	4,000	5,000	3,000	5,000	5,000	52,000	80,000
	TPC	6,000	9,000	47,000	46,000	56,000	85,000	251,000	500,000

Related Operations and Maintenance Funding Requirements

Start of Operation or Beneficial Occupancy (fiscal quarter or date)	4QFY2027
Expected Useful Life (number of years)	20
Expected Future Start of D&D of this capital asset (fiscal quarter)	4QFY2047

(Related Funding requirements)

(dollars in thousands)

	Annual Costs		Life Cycle Costs	
	Current Total Estimate	Previous Total Estimate	Current Total Estimate	Previous Total Estimate
Operations	115,800	TBD	2,316,000	TBD
Maintenance	6,261	TBD	125,222	TBD
Total, Operations & Maintenance	**122,061**[b]	**TBD**	**2,441,222**	**TBD**

Required D&D Information

Area	Square Feet
Area of new construction	10,000
Area of existing facility(s) being replaced	N/A
Area of additional D&D space to meet the "one-for-one" requirement	N/A

Name(s) and site location(s) of existing facility(s) to be replaced:
Construction will be within existing facilities at SRS (K Area and E Area) that are vacant/empty.

Acquisition Approach

The Acquisition strategy will be developed as part of the CD-1 process that is scheduled for approval in FY 2018.

[a] The costs and schedules are only estimates and consistent with the high end of the cost range. No construction will be performed until the project performance baseline has been validated and CD-3 has been approved.
[b] The rough order of magnitude is based on estimates developed for the Alternative of Analysis. It does not include future capital reinvestments. These are only estimates and will be updated once the LCCE is validated and CD-1 is approved. The annual amount was developed by taking the escalated LCCE and divided by the projected 20 years of operation.

99-D-143, Mixed Oxide (MOX) Fuel Fabrication Facility,
Savannah River Site (SRS), Aiken, South Carolina
Project is for Design and Construction

Significant Changes and Summary

Significant Changes

This construction Project Data Sheet (CPDS) is an update of the Fiscal Year (FY) 2017 CPDS and does not include a new start for the budget year.

In FY 2018, the Administration is proposing to terminate construction of the MOX project and will pursue the dilute and dispose strategy for plutonium disposition. The Department will request the MOX prime contractor determine activities required to place the facility and project in a safe and secure state, winding down construction, design, support, and procurement efforts as quickly as possible so that termination can be done efficiently and cost effectively. The Department of Energy (DOE) will issue contract direction to MOX Services as early as practicable to halt construction activities and to develop a termination plan. DOE will brief the details of the termination plan to the cognizant Congressional committees.

Summary

DOE approved Order 413.3B's Critical Decision (CD) -3, Start of Construction on April 11, 2007, with a Total Project Cost (TPC) of $4,814,329 and CD-4 of FY 2016. Construction began on August 1, 2007, as directed by the Revised Continuing Resolution, 2007, Public Law 110-5. A revised baseline change was approved on December 17, 2008, with a TPC of $4,857,129 and CD-4 of FY 2017. The project cost has exceeded the 2008 TPC and has not been re-baselined. Since 2012, the Department has requested multiple independent cost estimates. The most recent Performance Baseline update was completed in 2016 by the DOE Office of Project Management Oversight in partnership with the U.S. Army Corps of Engineers (USACE). This update, determined reliable by the GAO, estimated a TPC of $17,169,258 and CD-4 of FY 2048.

A Federal Project Director (FPD) has been assigned to this project and has approved this CPDS.

FY 2016 Project Status

In FY 2016, the overall scope continued to focus on commodity installation. Construction activities included continuing to set prefabricated pipe modules in the active gallery; installation of Heating, Ventilation, and Air Conditioning (HVAC) duct, supports and dampers; mechanical process system and glovebox installation; closure of Temporary Construction Openings; installation of electrical duct banks; installation of process pipe and the associated chemical commodity equipment; and installation of electrical equipment, supports, and cable trays.

FY 2017 Planned Description of Activities

In FY 2017, the Department proposed termination of the MOX project in accordance with DOE Order 413.3B. The FY 2017 Continuing Resolution directed the Department to continue construction activities. In FY 2017, construction continued focusing on commodity installation. Primary areas of work include the third floor of the Manufacturing Process (MP) area while completing installation activities and closing work packages in the first and second floors of the Aqueous Polishing (AP) areas. Construction continued on installing prefabricated pipe modules in the active gallery; installation of HVAC duct, supports, and dampers; mechanical process system and glovebox installation; closure of Temporary Construction Openings; installation of electrical duct banks; and installation of process pipe and the associated chemical commodity equipment.

FY 2018 Planned Description of Activities

The Department will direct the MOX prime contractor to develop a plan within 90 days to terminate the project and begin to secure information, materials, and equipment at the job site to protect government assets and ensure the safety of workers. The disposition of temporary and permanent facilities will be planned; equipment will be prepared for storage or disposition as appropriate. In general, the contractor will begin termination of the sub-contracts and leases. Where cost effective, the MOX prime contractor will be directed to complete existing subcontracts and leases, but- refrain from beginning any new procurements without government approval. DOE will also begin discussions to negotiate the final costs to terminate the contract. Notification of personnel actions will be made as required by applicable law. A final estimate to complete the project shutdown and contract termination is expected to be produced during late calendar year 2018, with final termination completed in FY 2020.

Critical Milestone History

	CD-0	Conceptual Design Complete	CD-1	CD-2	Final Design Complete	CD-3	D&D Complete	CD-4
FY 2000	N/A		2QFY1999	N/A	4QFY2001	1QFY2002	N/A	4QFY2005
FY 2001	N/A		2QFY1999	N/A	3QFY2002	4QFY2002	N/A	1QFY2006
FY 2002	N/A		2QFY1999	N/A	4QFY2002	2QFY2003	N/A	1QFY2007
FY 2003	N/A		2QFY1999	N/A	4QFY2003	2QFY2004	N/A	4QFY2007
FY 2004	N/A		2QFY1999	N/A	1QFY2004	2QFY2004	N/A	4QFY2007
FY 2005	N/A		2QFY1999	N/A	3QFY2004	3QFY2005	N/A	2QFY2009
FY 2006	N/A		2QFY1999	N/A	1QFY2005	3QFY2005	N/A	TBD
FY 2007 PB	N/A		2QFY1999	N/A	4QFY2009	2QFY2007	N/A	4QFY2014
FY 2008	1QFY1997		2QFY1999	2QFY2007	2QFY2011	2QFY2007	N/A	4QFY2013
FY 2009	1QFY1997		03/22/1999	04/11/2007	2QFY2013[a]	04/11/2007[b]	N/A	4QFY2016
FY 2010	1QFY1997		03/22/1999	04/11/2007	2QFY2013	04/11/2007	N/A	1QFY2017
FY 2011	1QFY1997		03/22/1999	04/11/2007	2QFY2013	04/11/2007	N/A	1QFY2017
FY 2012	1QFY1997		03/22/1999	04/11/2007	2QFY2013	04/11/2007	N/A	1QFY2017
FY 2013	1QFY1997		03/22/1999	04/11/2007	2QFY2013	04/11/2007	N/A	1QFY2017
FY 2014	1QFY1997		03/22/1999	04/11/2007	4QFY2014	04/11/2007	N/A	TBD[b]
FY 2015	1QFY1997		03/22/1999	04/11/2007	4QFY2016	04/11/2007	N/A	TBD[b]
FY 2016	1QFY1997	10/31/1997	03/22/1999	04/11/2007	4QFY2016	04/11/2007	N/A	4QFY2031
FY 2017	1QFY1997	10/31/1997	03/22/1999	04/11/2007	4QFY2016	04/11/2007	N/A	NA
FY 2018	1QFY1997	10/31/1997	03/22/1999	04/11/2007	TBD[b]	04/11/2007	N/A	4QFY2048

CD-0 – Approve Mission Need
Conceptual Design Complete – Actual date the conceptual design was completed (if applicable)
CD-1 – Approve Alternative Selection and Cost Range
CD-2 – Approve Performance Baseline
Final Design Complete – Estimated/Actual date the project design will be/was complete(d)
CD-3 – Approve Start of Construction/Execution
D&D Complete –Completion of D&D work (see Section 9)
CD-4 – Approve Start of Operations or Project Completion
PB – Indicates the Performance Baseline

[a] The Department approved CD-3 (Start of Construction) on April 11, 2007; however, as directed by the Revised Continuing Resolution, 2007, Public Law 110-5, construction began on August 1, 2007.
[b] The project is being terminated.

(fiscal quarter or date)

	Performance Baseline Validation	CD 2A/3A	CD 2B/3B
FY 2005	N/A	09/30/2005	N/A
FY 2006	07/07/2006	N/A	N/A
FY 2007	N/A	N/A	04/06/2006

CD 2A/3A - Approval to start Site Preparation
CD 2B/3B - Approval to begin long lead procurements ("trapped" tanks, steel embeds, reinforcing steel, barrier doors)

Project Cost History

(dollars in thousands)
(fiscal quarter or date)

	TEC, Design	TEC, Construction	TEC, Total	OPC, Except D&D	OPC, D&D	OPC, Total	TPC
FY 2000	TBD	TBD	383,186	0	N/A	TBD	N/A
FY 2001	TBD	TBD	383,186	0	N/A	TBD	N/A
FY 2002	TBD	TBD	TBD	TBD	N/A	TBD	N/A
FY 2003	TBD	TBD	TBD	TBD	N/A	TBD	N/A
FY 2004	TBD	TBD	TBD	TBD	N/A	TBD	N/A
FY 2005	TBD	TBD	TBD	TBD	N/A	TBD	N/A
FY 2006	TBD	TBD	TBD	TBD	N/A	TBD	N/A
FY 2007	TBD	TBD			N/A		
PB			3,277,984	354,108		354,108	3,632,092
FY 2008	TBD	TBD	3,868,628	830,701	N/A	830,701	4,699,329
FY 2009	TBD	TBD	3,938,628	875,701	N/A	875,701	4,814,329
FY 2010	TBD	TBD	3,975,828	881,301	N/A	881,301	4,857,129
FY 2011	960,925	3,014,903	3,975,828	881,301	N/A	881,301	4,857,129
FY 2012	978,073	2,997,755	3,975,828	881,301	N/A	881,301	4,857,129
FY 2013	994,073	2,981,755	3,975,828	881,301	N/A	881,301	4,857,129
FY 2014	TBD	TBD	TBD	TBD	N/A	TBD	TBD
FY 2015	TBD	TBD	TBD	TBD	N/A	TBD	TBD
FY 2016	1,072,430	9,179,089	10,251,519	2,439,333	N/A	2,439,333	12,690,852[b]
FY 2017	TBD[a]	TBD[a]	TBD[a]	TBD[a]	N/A	TBD[a]	TBD[a]
FY 2018[a]	TBD[a]	TBD[a]	TBD[a]	TBD[a]	N/A	TBD[a]	17,169,258[b]

Project Scope and Justification

Scope and Justification:

The MOX Fuel Fabrication Facility (MFFF) project is being terminated in FY 2018.

[a] The MFFF project is being terminated and scope, schedule, and costs will be refined in subsequent budget submissions upon the Department's approval of the termination plan for the MFFF project.
[b] This updated TPC reflects the 2016 updated performance baseline developed by the DOE Office of Project Management Oversight in partnership with USACE.

Financial Schedule

	(dollars in thousands)			
	Appropriations	Plan	Obligations	Costs
Total Estimated Cost (TEC)				
Design				
FY 1999	N/A	9,600	N/A	2,545
FY 2000	N/A	30,775	N/A	33,512
FY 2001	N/A	25,943	N/A	29,938
FY 2002	N/A	65,993	N/A	52,513
FY 2003	N/A	92,088	N/A	82,022
FY 2004	N/A	81,081	N/A	93,457
FY 2005	N/A	251,195	N/A	216,801
FY 2006	N/A	119,853	N/A	165,618
FY 2007	N/A	65,133	N/A	62,342
FY 2008 [a]	N/A	56,045	N/A	58,958
FY 2009 [b]	N/A	72,509	N/A	68,395
FY 2010	N/A	70,987	N/A	65,056
FY 2011	N/A	51,134	N/A	50,757
FY 2012	N/A	29,094	N/A	34,642
FY 2013	N/A	37,000	N/A	24,445
FY 2014 Reprogramming	N/A	0	N/A	0
FY 2014	N/A	14,000	N/A	19,789
FY 2015	N/A	30,000	N/A	24,895
FY 2016	N/A	13,000	N/A	14,758
Total, Design	**N/A**	**1,115,430**	**N/A**	**1,102,839**
Construction				
FY 2004	N/A	0	N/A	0
FY 2005	N/A	44,100	N/A	0
FY 2006	N/A	217,469	N/A	15,210
FY 2007	N/A	197,367	N/A	115,065
FY 2008 [a]	N/A	290,139	N/A	209,174
FY 2008 (rescinded PY unobligated balance)	N/A	0	N/A	0
FY 2009 [b]	N/A	395,299	N/A	301,323
FY 2010	N/A	433,251	N/A	429,326
FY 2011	N/A	450,654	N/A	482,330
FY 2012	N/A	406,078	N/A	671,212
FY 2013	N/A	363,990	N/A	476,204
FY 2014 Reprogramming	N/A	59,242	N/A	0
FY 2014	N/A	329,500	N/A	301,777

[a] Includes $31M for long-lead procurements.
[b] Includes $37.6M for long-lead procurements.

(dollars in thousands)

	Appropriations	Plan	Obligations	Costs
FY 2015	N/A	305,000	N/A	309,403
FY 2016	N/A	321,000	N/A	323,048
FY 2017	N/A	310,000	N/A	304,957
FY 2018	N/A	255,000	N/A	305,000
FY 2019	TBD	TBD	TBD	TBD
FY 2020	TBD	TBD	TBD	TBD
FY 2021	TBD	TBD	TBD	TBD
Total, Construction	**TBD**	**TBD**	**TBD**	**TBD**
TEC				
FY 1999	28,000	9,600	9,600	2,545
FY 2000	12,375	30,775	30,775	33,512
FY 2001	25,943	25,943	25,943	29,938
FY 2002	65,993	65,993	65,993	52,513
FY 2003	92,088	92,088	92,088	82,022
FY 2004	360,274	81,081	81,081	93,457
FY 2005	365,087	295,295	295,295	216,801
FY 2006	217,800	337,322	337,322	180,828
FY 2007	262,500	262,500	262,500	177,407
FY 2008	231,721	346,184	346,184	268,132
FY 2008 (rescinded PY unobligate	-115,000	0	0	0
FY 2009	467,808	467,808	467,808	369,718
FY 2010	504,238	504,238	504,238	494,382
FY 2011	501,788	501,788	501,788	533,087
FY 2012	435,172	435,172	435,172	705,854
FY 2013	400,990	400,990	400,990	500,649
FY 2014 Reprogramming	59,242	59,242	59,242	0
FY 2014	343,500	343,500	343,500	321,566
FY 2015	335,000	335,000	335,000	334,298
FY 2016	330,000	330,000	330,000	337,806
FY 2017	310,000	310,000	310,000	307,353
FY 2018	255,000	255,000	255,000	305,000
FY 2019	TBD	TBD	TBD	TBD
FY 2020	TBD	TBD	TBD	TBD
FY 2021	TBD	TBD	TBD	TBD
Total, TEC	**TBD**	**TBD**	**TBD**	**TBD**

	(dollars in thousands)			
	Appropriations	Plan	Obligations	Costs
Other Project Cost (OPC)				
OPC except D&D				
FY 1999	5,000	5,000	5,000	4,500
FY 2000	5,000	5,000	5,000	4,500
FY 2001	5,000	5,000	5,000	5,000
FY 2002	5,000	5,000	5,000	5,000
FY 2003	8,000	8,000	8,000	5,000
FY 2004	9,292	9,292	9,292	11,500
FY 2005	9,357	9,357	9,357	3,749
FY 2006	28,200	21,300	21,300	7,023
FY 2007	915	7,792	7,792	9,278
FY 2008 [a]	47,068	47,068	47,068	15,746
FY 2009 [b]	0	0	0	21,451
FY 2010	56,466	56,466	56,466	19,344
FY 2011	4,000	4,000	4,000	50,211
FY 2012	47,035	47,035	47,035	33,142
FY 2013	40,000	40,000	40,000	35,065
FY 2014	40,000	40,000	40,000	34,582
FY 2015	10,000	10,000	10,000	15,463
FY 2016	10,000	10,000	6,000	22,296
FY 2017	25,000	25,000	25,000	20,552
FY 2018	15,000	15,000	15,000	30,000
FY 2019	TBD	TBD	TBD	TBD
FY 2020	TBD	TBD	TBD	TBD
FY 2021	TBD	TBD	TBD	TBD
Total, OPC except D&D	**TBD**	**TBD**	**TBD**	**TBD**

[a] Includes $31M for long-lead procurements.
[b] Includes $37.6M for long-lead procurements.

	(dollars in thousands)			
	Appropriations	Plan	Obligations	Costs
Total Project Cost (TPC)				
FY 1999	33,000	14,600	14,600	7,045
FY 2000	17,375	35,775	35,775	38,012
FY 2001	30,943	30,943	30,943	34,938
FY 2002	70,993	70,993	70,993	57,513
FY 2003	100,088	100,088	100,088	87,022
FY 2004	369,566	90,373	90,373	104,957
FY 2005	374,444	304,652	304,652	220,550
FY 2006	246,000	358,622	358,622	187,851
FY 2007 [a]	263,415	270,292	270,292	186,685
FY 2008 [b c]	278,789	393,252	393,252	283,878
FY 2008 (rescinded PY unobligate	-115,000	0	0	0
FY 2009 [d e]	467,808	467,808	467,808	391,169
FY 2010 [f]	560,704	560,704	560,704	513,726
FY 2011 [g]	505,788	505,788	505,788	583,298
FY 2012	482,207	482,207	482,207	738,996
FY 2013	440,990	440,990	440,990	535,714
FY 2014 Reprogramming	59,242	59,242	59,242	0
FY 2014	383,500	383,500	383,500	356,148
FY 2015	345,000	345,000	345,000	349,761
FY 2016	340,000	340,000	340,000	360,102
FY 2017	335,000	335,000	335,000	327,875
FY 2018	270,000	270,000	270,000	335,000
FY 2019	TBD	TBD	TBD	TBD
FY 2020	TBD	TBD	TBD	TBD
FY 2021	TBD	TBD	TBD	TBD
FY 2022	TBD	TBD	TBD	TBD
Total, TPC [h]	**TBD**	**TBD**	**TBD**	**TBD**

[a] Includes $31M for long-lead procurements.
[b] Includes $37.6M for long-lead procurements.
[c] MOX funded within the Nuclear Energy appropriation.
[d] MOX funded within the Other Defense Activities appropriation.
[e] Includes $177.4M for long-lead procurements.
[f] Includes $167.9M for long-lead procurements.
[g] Includes $67.1M for long-lead procurements.
[h] Scope, schedule, and costs will be refined in subsequent budget submissions upon the Department's approval of the termination plan for the MFFF project.

Details of Project Cost Estimate

(dollars in thousands)

	Current Total Estimate	Previous Total Estimate[a]	Original Validated Baseline
Total Estimated Cost (TEC)			
Design (PED)			
Design	TBD	1,072,430	916,148
Contingency	0	0	0
Total, PED	**TBD**	**1,072,430**	**916,148**
Construction			
Site Preparation	TBD	39,957	39,929
Equipment	TBD	800,000	251,791
Other Construction	TBD	7,209,398	2,067,639
Contingency	TBD	1,129,734	663,121
Total, Construction	**TBD**	**9,179,089**	**3,022,480**
Total, TEC	**TBD**	**10,251,519**	**3,938,628**
Contingency, TEC	TBD	1,129,734	663,121
Other Project Cost (OPC)			
OPC except D&D			
Conceptual Planning	TBD	37,723	37,723
Conceptual Design	0	0	0
Start-up	TBD	1,811,929	650,468
Other OPC	TBD	119,415	NA
Contingency	TBD	470,266	187,510
Total, OPC except D&D	**TBD**	**2,439,333**	**875,701**
D&D			
D&D	0	0	0
Contingency	0	0	0
Total, D&D	**0**	**0**	**0**
Total, OPC	**TBD**	**2,439,333**	**875,701**
Contingency, OPC	TBD	470,266	187,510
Total, TPC	**17,169,258[b]**	**12,690,852**	**4,814,329**
Total, Contingency	**TBD**	**1,600,000**	**850,631**

[a] Scope, schedule, and costs will be refined in subsequent budget submissions upon the Department's approval of the termination plan for the MFFF project. The current total estimate shown reflects the high end range from the USACE estimate.

[b] This updated TPC reflects the 2016 updated performance baseline developed by the DOE Office of Project Management Oversight in partnership with USACE.

Schedule of Appropriation Requests

(dollars in thousands)

		Prior Years	FY 2015 [a]	FY 2016 [b]	FY 2017 [b]	FY 2018 [b]	FY 2019 [b]	FY 2020 [b]	FY 2021 [b]	Outyears [b]	Total
FY 2009	TEC	3,512,050	125,611	300,967	0	0	0	0	0	0	**3,938,628**
	OPC	781,998	85,771	7,932	0	0	0	0	0	0	**875,701**
	TPC	4,294,048	211,382	308,899	0	0	0	0	0	0	**4,814,329**
FY 2010	TEC	3,812,250	125,773	37,805	0	0	0	0	0	0	**3,975,828**
	OPC	783,699	91,603	5,999	0	0	0	0	0	0	**881,301**
	TPC	4,595,949	217,376	43,804	0	0	0	0	0	0	**4,857,129**
FY 2011 [c d]	TEC	3,812,250	125,773	37,805	0	0	0	0	0	0	**3,975,828**
	OPC	783,699	91,603	5,999	0	0	0	0	0	0	**881,301**
	TPC	4,595,949	217,376	43,804	0	0	0	0	0	0	**4,857,129**
FY 2012	TEC	3,812,250	125,773	37,805	0	0	0	0	0	0	**3,975,828**
	OPC	783,699	91,603	5,999	0	0	0	0	0	0	**881,301**
	TPC	4,595,949	217,376	43,804	0	0	0	0	0	0	**4,857,129**
FY 2013	TEC	3,963,250	9,773	2,805	0	0	0	0	0	0	**3,975,828**
	OPC	632,699	207,603	40,999	0	0	0	0	0	0	**881,301**
	TPC	4,595,949	217,376	43,804	0	0	0	0	0	0	**4,857,129**
FY 2014	TEC	4,213,622	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	**TBD**
	OPC	310,333	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	**TBD**
	TPC	4,523,955	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	**TBD**
FY 2014 Reprogramming	TEC	3,916,020	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	**TBD**
	OPC	270,333	0	0	0	0	0	0	0	0	**270,333**
	TPC	4,186,353	0	0	0	0	0	0	0	0	**TBD**
FY 2015	TEC	4,259,520	196,000	196,000	196,000	196,000	196,000	196,000	196,000	TBD	**TBD**
	OPC	310,333	25,000	25,000	25,000	25,000	25,000	25,000	25,000	TBD	**TBD**
	TPC	4,569,853	221,000	221,000	221,000	221,000	221,000	221,000	221,000	TBD	**TBD**
FY 2016	TEC	4,259,520	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	**10,251,519**
	OPC	310,333	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	**2,439,333**
	TPC	4,569,853	345,000	345,000	221,000	221,000	221,000	221,000	221,000	6,891,999	**12,690,852**
FY 2017	TEC	4,259,520	335,000	330,000	255,000	171,000	71,000	0	0	0	**TBD**
	OPC	310,333	10,000	10,000	15,000	50,000	150,000	221,000	221,000	TBD	**TBD**
	TPC	4,569,853	345,000	340,000	270,000	221,000	221,000	221,000	221,000	TBD	**TBD**
FY 2018	TEC	4,259,520	335,000	330,000	310,000	255,000	TBD	TBD	TBD	TBD	**TBD**
	OPC	310,333	10,000	10,000	25,000	15,000	TBD	TBD	TBD	TBD	**TBD**
	TPC	4,569,853	345,000	340,000	335,000	270,000	TBD	TBD	TBD	TBD	**17,169,258**

[a] These numbers reflect the slow-down of the current plutonium disposition strategy while assessing alternative strategies.
[b] Scope, schedule, and costs will be refined in subsequent budget submissions upon the Department's approval of the termination plan for the MFFF project.
[c] FY 2011 OPC appropriations were only $4 million vs. $30 million planned.
[d] FY 2011 total estimated cost appropriations were increased by $26 million.

Related Operations and Maintenance Funding Requirements

Start of Operation of Beneficial Occupancy (fiscal quarter or date)	N/A[a]
Expected Useful Life (number of years) (after hot startup) [a]	N/A[a]
Expected Future Start of D&D of this capital asset (fiscal quarter)	N/A[a]

(Related Funding Requirements)

(dollars in thousands)

	Annual Costs		Life Cycle Costs	
	Current Total	Previous Total	Current Total	Previous Total
Operations	N/A	470,021	N/A	7,111,447
Security	N/A	73,190	N/A	1,097,844
Total, Operations and Security	**0**	**543,211**	**0**	**8,209,291**

Lifecycle cost estimate shown have not been updated since the FY 2014 budget submittal. MOX project is being terminated in FY 2018.

D&D Information

The new area being constructed in this project is not replacing existing facilities.

Area	Square Feet
Area of new construction	N/A
Area of existing facility(s) being replaced	N/A
Area of additional D&D space to meet the "one-for-one" requirement	N/A

Name(s) and site location(s) of existing facility(s) to be replaced:
The new construction is not replacing an existing facility.

Acquisition Approach

The procurement strategy for the MOX facility involved awarding a base contract to Duke Cogema Stone & Webster (now Shaw AREVA MOX Services) in March 1999 for design, licensing, and irradiation services associated with fuel qualification activities and reactor licensing. Three options were included in the base contract for: (1) construction and management oversight; (2) hot start-up, operations, and irradiation services; and (3) deactivation—which can be awarded separately. Option 1 was exercised by DOE in May 2008. In January 2009, an Early Option 2 proposal was submitted to NNSA for consideration. The proposed work scope included the fabrication of eight fuel assemblies as a part of the facility hot start-up plan.

CB&I AREVA MOX Services (MOX Services) is a Limited Liability Company (LLC) comprised of Chicago Bridge and Iron (CB&I) Company and the French company, AREVA. In February 2013 CB&I completed its acquisition of the previous LLC member, The Shaw Group. Since CB&I is a foreign-based company, a proxy company has been formed to address U.S. government foreign ownership and control regulations. As a result, a proxy company under CB&I named CB&I Project Services Group, LLC, was formed to oversee CB&I's security-sensitive work such as the MFFF Project.

Construction of the MOX facility is being performed through a combination of fixed-price/cost-plus sub-contracts and MOX Services' direct managed construction craft personnel. A combination of award fees and incentive fees are included in the overall contract with MOX Services to reward performance within established project baselines.

[a] Project is being terminated.

In FY 2018, DOE will issue contract direction to MOX Services as early as practicable to halt construction activities. To guide the termination activities, the Department will utilize lessons learned captured by the Defense Acquisition University Smart ShutDown Guidebook and other lessons learned from termination of other Major System Acquisition Projects. The agreed upon termination plan will support the Department's negotiation of the final costs to terminate the contract. Notification of personnel actions will be made as required by applicable law. A final estimate to complete the shutdown of the project and contract termination is expected to be completed during late calendar year 2018, with final termination completed in FY 2020. The Department will brief the details of the termination plan to the cognizant congressional committees.

Nuclear Counterterrorism and Incident Response Program

Overview

One of NNSA's enduring missions is to help protect our nation and its citizens from the threat of nuclear terrorism or an accident or incident involving the release of nuclear or radiological material. The NNSA Nuclear Counterterrorism and Incident Response (NCTIR) Program evaluates and assesses nuclear or radiological threats and leverages that knowledge to provide interagency policy, contingency planning, training, and capacity building. Specifically, this knowledge supports nuclear incident engagement to strengthen and exercise national and international radiological and nuclear counterterrorism, counterproliferation, and incident response capabilities. NCTIR also executes DOE/NNSA's Emergency Management Enterprise (EME) program that administers implementation and support of emergency management for all DOE/NNSA offices and sites; EME manages all DOE/NNSA Emergency Operations Centers, Emergency Communications Network (ECN), Policy Management, Training, Exercises, and Continuity of Operations Plan (COOP) activities. The FY 2018 Budget Request for the NCTIR Program supports programs to strategically manage and deploy expert scientific teams and equipment to provide a technically trained, rapid response to nuclear or radiological incidents and accidents worldwide. The NCTIR Program includes the subprograms noted below:

- The Emergency Operations element of the EME program provides all hazards emergency management policy development, operations planning, operations support, incident management training, Homeland Security Exercise and Evaluation Program (HSEEP) planning and management, incident management, after action improvement plan activities, ECN capability, and ECN technical assistance for the Department. The EME assists NNSA and DOE sites and deployable teams with implementation of emergency management policies, practices, and technical support and conducts planning, testing, training, and exercises to enhance and complement the Department's capability for its all-hazards emergency management mission. The Continuity Program Office (CPO) is responsible for all of DOE and NNSA program requirements and Homeland Security Council (HSC)/National Security Council (NSC) required policy initiatives. This program develops and manages the headquarters and the field Continuity of Operations and Continuity of Government training and plans and oversees the annual Continuity of Government exercise program.

- The Emergency Response/Nuclear Incident Response subprogram provides a flexible, efficient, and effective response capability for any nuclear/radiological incident in the United States or abroad by applying the unique technical expertise within NNSA's nuclear security enterprise. This is accomplished by ensuring that appropriately trained personnel and specialized technical equipment are ready to deploy to provide an integrated response for radiological search, render safe, and consequence management for nuclear/radiological emergencies, national exercises, and security operations for large special events.

- The National Technical Nuclear Forensics subprogram maintains the operational capability for pre-detonation device disassembly and examination, provides operational support for response to post-detonation events, and coordinates the analysis of Special Nuclear Materials. The pre-detonation mission maintains a readiness posture to deploy disposition and device assessment teams and conducts laboratory operations in support of analysis of bulk actinides. The post-detonation mission maintains a readiness posture to deploy subject matter expertise and operational capabilities in support of ground sample collections and device assessments. These operational programs ultimately support law enforcement and attribution.

- Counterterrorism Response and Capacity Building leverages NCTIR's technical, operational, and threat expertise to strengthen preparedness and capabilities to respond to all radiological or nuclear incidents, accidents, and terror threats posing a potential risk to the United States, its citizens, or its interests. These activities exercise and expand state and local radiological and nuclear incident response capabilities and enable key foreign partners to effectively address radiological or nuclear incidents in their region--with or without U.S. involvement--as far from U.S. territory as possible. These capacity-building activities include technical exchanges, joint technical experiments, workshops, joint exercises, technical and operational assistance and support, radiation characterization and monitoring equipment loans, and strategic dialogues with key partners.

- The Nuclear Counterterrorism (NCT) Assessment subprogram provides the nation's technical capacity to understand

and defeat nuclear threat devices (NTD) including Improvised Nuclear Devices (INDs) and lost or stolen foreign nuclear weapons. NCT Assessment also protects IND design information, manages the assessment of NTD-related open source information, and sustains international technical and policy engagements through the Nuclear Threat Reduction (NTR) channels with the Republic of France and the United Kingdom. Technical work on device assessment also supports the Department of Defense (DOD), Federal Bureau of Investigation (FBI), and Intelligence Community in policy, planning, and operational capabilities.

Highlights of the FY 2018 Budget Request

The FY 2018 Budget Request sustains the Nuclear Counterterrorism & Incident Response level of effort and includes additional funding to provide technical equipment and training to address the increased demands to counter the threat of nuclear terrorism and associated nuclear threat devices. NNSA, in partnership with the FBI, sustains radiological/nuclear device stabilization capabilities in selected cities and provides yearly recurring sustainment training and equipment maintenance, which is expanding in accordance with joint DOE-FBI plan. The Request also provides funding for communications and IT infrastructure improvements for both Departmental emergency management needs as well as the National Assets responding in support of a national or international incident. The Request allows for the continuation of directed upgrades to the classified and unclassified communications networks supporting emergency response and makes additional improvements as required to meet national cyber security standards. To avoid degradation of these critical communications systems, these upgrades are needed to replace operating systems currently in use on the ECN and to ensure redundant classified call management capability. The Request enables procurement of mission critical equipment that has exceeded its useful life.

At the request of DOD and in support of national policy objectives, NCT Assessment will complete its campaign to gather existing experimental and other data, identify information and modeling gaps, and continue operationalizing the development of the national capability to predict the behavior of non-stockpile nuclear materials or components in response to innovative approaches for standoff disablement. This activity will continue to include experimental and computational investigations that improve our confidence in modeling capabilities.

Additionally, this Request reflects transfer of ongoing nuclear forensics post-detonation device modeling work within the NCTIR account from NCT Assessment to Nuclear Forensics, which helps consolidate nuclear forensics enhancements with the office responsible for nuclear forensics.

Nuclear Counterterrorism and Incident Response Program Funding

	(Dollars in Thousands)			
	FY 2016 Enacted	FY 2017 Annualized CR*	FY 2018 Request	FY 2018 vs FY 2016
Nuclear Counterterrorism & Incident Response Program				
Emergency Operations	25,112	24,789	35,515	+10,403
Emergency Response/Nuclear Incident Response	134,192	132,464	161,045	+26,853
National Technical Nuclear Forensics	10,041	9,912	14,600	+4,559
Counterterrorism Response & Capacity Building	7,256	7,163	8,100	+844
Nuclear Counterterrorism Assessment	57,789	57,045	58,100	+311
Total, Nuclear Counterterrorism & Incident Response Program	**234,390**	**231,372**	**277,360**	**+42,970**

* The FY 2017 Annualized CR amounts reflect the P.L. 114-254 continuing resolution level annualized to a full year. These amounts are shown only at the congressional control level and above, below that level, a dash (-) is shown.

Nuclear Counterterrorism and Incident Response Program
Explanation of Major Changes
(Dollars in Thousands)

	FY 2018 vs FY 2016
Nuclear Counterterrorism and Incident Response Program	
Emergency Operations: Increase will upgrade and transfer ECN hosting to a Gold Star site; create and implement a technical assistance program to corporately address DNFSB recommendations.	**+10,403**
Emergency Response/Nuclear Incident Response: Increase provides funding for highly secure communication capabilities and associated personnel and enables procurement of mission critical equipment.	**+26,853**
National Technical Nuclear Forensics: Increase enables advancement of the device assessment/reconstruction capability and reflects realignment of nuclear forensics device modeling work from NCT.	**+4,559**
Counterterrorism Response and Capacity Building: Increase addresses growth in requirements for foreign partner nuclear response capability improvements and enhance critical incident response techniques and approaches.	**+844**
Nuclear Counterterrorism Assessment: Increase supports additional efforts in IND technical assessments.	**+311**
Total, Nuclear Counterterrorism and Incident Response Program	**+42,970**

Nuclear Counterterrorism and Incident Response Program
Emergency Operations

Description

The Emergency Operations subprogram is focused on emergency preparedness, readiness assurance, and incident response to sustain the DOE/NNSA mission, maintain readiness, and to ensure a fully implemented and integrated emergency management enterprise system throughout the Department.

The FY 2018 Budget Request will continue to focus on the integration and enhancement of Emergency Operations activities.

The Emergency Operations subprogram serves as the primary point of interest for implementing, coordinating, and integrating emergency management policy, preparedness, and incident response support activities within DOE/NNSA, including coordinating and supporting NNSA field and supporting contractor implementation and oversight of emergency management policy.

To strengthen emergency preparedness across DOE/NNSA, this subprogram develops and implements specific programs, plans, processes, and systems to minimize the impacts of emergencies on worker and public health and safety, the environment, and national security. This is accomplished by promulgating appropriate departmental policies and implementing requirements and guidance; developing and conducting training and other emergency preparedness activities; supporting DOE/NNSA readiness assurance activities and participating in interagency emergency planning and coordination activities. The Office of Operations and Exercises and the Office of Preparedness will develop standards for exercises and provide training to support an all hazards emergency management capability.

This subprogram operates the DOE/NNSA Consolidated Emergency Operations Center (CEOC) and the ECN. The DOE/NNSA CEOC provides the core functions of supporting departmental command, control, communications, Geographic Information System (GIS) data, and situational intelligence requirements for all categories of DOE emergency response situations on a 24/7/365 day basis. The DOE/NNSA CEOC will broaden and strengthen all its hazards incident support effectiveness through training exercises and improvement efficiencies developed by the Office of Operations and Exercises and the Office of Preparedness.

The ECN is the Department's high-reliability communication system that supports collecting, processing, and disseminating emergency related information from multiple internal and external sources. The ECN ensures DOE/NNSA decision-makers have a common operating picture during the management and support of operational emergencies, energy emergencies, and emergency assistance including national and international counterterrorism and COOP related events. The network supports classified and unclassified voice, video, and data transmissions. The system is expected to grow to over 110 nodes by end of FY 2020, a 266% increase over 2006, and a 23% increase over FY 2015. ECN provides support for the Legacy and COOP missions and the Response/Render Safe, Forensics, and Counterterrorism missions. The expansion has included the installation of nodes into other government agencies and other countries.

The Continuity of Operations Program (COOP), supports all aspects identified in Presidential Policy Directive 40 (PPD-40), *National Continuity Policy,* Federal Continuity Directive (FCD) 1, Federal Executive Branch National Continuity Program Requirements, FCD 2 Federal Executive Branch Mission Essential National Continuity Program Requirements, and OSTP/OMB D-16-1, Minimum Requirements for Federal Executive Branch Continuity Communications Capabilities which supports training and exercises, equipment, maintenance and upgrades to classified facilities along with a Headquarters continuity facility and a devolution facility outside of the National Capital Region.

- FCD 1 - Federal Executive Branch National Continuity Program Requirements
- FCD 2 - Federal Executive Branch Mission Essential Functions and Candidate Primary Mission Essential Functions Identification and Submission Process
- OSTP/OMB D-16-1 - Minimum Requirements for Federal Executive Branch Continuity Communications Capabilities

Emergency Operations

Activities and Explanation of Changes

FY 2016 Enacted	FY 2018 Request	Explanation of Changes FY 2018 vs FY 2017
Emergency Operations $25,112	**Emergency Operations $35,515**	**Emergency Operations +$10,403**
• Provided contract support for implementing actions from Defense Nuclear Facility Safety Board (DNFSB) Recommendation 2014-01. • Provided for program's share of support to the Department's emergency operations. • Provided for required contract support; ensured adequate training; and supported exercises needed to support emergency operations at full capacity. • Provided Nuclear Incident Team developed efficiencies for an effective all hazards emergency management capability.	• Administers the Department's Emergency Management System. • Manages the Department's Continuity Programs. • Manages contract support and technical assistance support for implementing actions from DNFSB Recommendation 2014-01. • Provides for program's share of support to the Department's emergency operations. • Provides for required contract support, ensure adequate training, and support HSEEP exercises needed to support emergency operations at full capacity. • Manages the Department's EOC and ECN.	• Increase required to support pending DOE order that designates Emergency Operations the office of primary responsibility for the Department's Emergency Management System. • Emergency Operations will revive, implement, and manage a technical assistance program to assist Defense Nuclear Facilities with addressing DNFSB recommendations. • Continue implementing five year exercise plan that requires scheduled contract support to effectively plan, train, execute, and sustain the HSEEP planning cycle. • Emergency operations will implement life cycle upgrades and transfer ECN M&O to a Gold Star hosting center.

Nuclear Counterterrorism and Incident Response Program
Emergency Response/Nuclear Incident Response

Description

The Emergency Response/Nuclear Incident Response subprogram serves as the last line of national defense in the face of a nuclear or radiological incident or accident. The mission is to apply the unique technical expertise within NNSA's nuclear security enterprise to prepare, prevent, mitigate, and respond, to an nuclear or radiological incident domestically or abroad, with responsive, flexible, efficient, and effective nuclear/radiological incident response capabilities. The strategic approach for incident response activities is to ensure a central point of contact and an integrated response to all emergencies involving radionuclides. This is accomplished by ensuring the appropriate infrastructure is in place to provide command, control, coordination, and communications of the NNSA nuclear incident response teams. It is also essential that response personnel are properly organized, trained and equipped to successfully resolve an incident.

Nuclear Emergency Support Team (NEST)

This activity provides the FBI, DOD, and the Department of Homeland Security (DHS) with technical assistance to respond domestically or abroad to incidents including terrorist threats involving nuclear materials. The primary missions of the specialized assets Accident Response Group (ARG), Radiological Assistance Program (RAP), Nuclear/Radiological Advisory Team (NRAT) and Joint Technical Operations Team (JTOT) are to search for, identify, characterize, render safe, and take possession of any nuclear device and support efforts to recover nuclear material outside of regulatory control. These assets also provide preventive radiological and nuclear detection support to federal, state, and local public safety organizations for major public events.

Other Assets

Additional assets provide assistance to federal, state and local entities to respond to accidents and incidents involving the potential or actual release of nuclear or radiological materials and advise on actions to reduce radiation exposure. These DOE/NNSA teams work closely with other DOE elements as well as other federal organizations, including DHS, Federal Emergency Management Agency (FEMA), Environmental Protection Agency (EPA), Nuclear Regulatory Commission (NRC) and DOD. The DOE/NNSA teams conduct exercises and provide support to the NEST programs to ensure safe incident resolution and the protection of public safety and the environment.

Stabilization Operations

This activity provides technical assistance to the FBI and select DOD elements to respond to nuclear threat devices by providing specialized technology and training for regional teams to locate and identify radiological/nuclear devices and to prevent these devices from detonating.

Activities and Explanation of Changes (Comparable)

FY 2016 Enacted	FY 2018 Request	Explanation of Changes FY 2018 vs FY 2016
Emergency Response/Nuclear Incident Response $134,192	**Emergency Response/Nuclear Incident Response $161,045**	**Emergency Response/Nuclear Incident Response +$26,853**
Nuclear Emergency Support Team	**Nuclear Emergency Support Team**	**Nuclear Emergency Support Team**

• Provided technical assistance to federal, state, tribal, local, and international government agencies to deal with incidents, including terrorist threats that involve potential use of nuclear materials.
• Provided technical assistance to a Lead Federal Agency to search for or detect illicit radiological or nuclear material.
• Continued collection and expert analysis of radiological material signatures through DOE Radiological Triage Program.
• Supported lead federal agencies to address threats posed by domestic and foreign terrorists likely to have both the will and means to employ nuclear devices and weapons-usable nuclear materials.
• Sustained Render Safe capabilities for an identified critical mission area in support of Principle Operational Partner. This effort includes predictive capability.
• Provided DOE/NNSA technical assistance for the planning, execution, and evaluation of national level exercises, including but not limited to: Marble Challenge, Nuclear Weapons Accident/Incident Exercises (NUWAIX), and other DOD-led exercises in which DOE/NNSA is not the lead.
	• Provide technical assistance to federal, state, tribal, local, and international government agencies to deal with incidents, including terrorist threats that involve potential use of nuclear materials.
	• Provide technical assistance to a Lead Federal Agency to search for or detect illicit radiological or nuclear material.
	• Continue collection and expert analysis of radiological material signatures through DOE Radiological Triage Program.
	• Support lead federal agencies to address threats posed by domestic and foreign terrorists likely to have both the will and means to employ nuclear devices and weapons-usable nuclear materials.
	• Sustain Render Safe capabilities for an identified critical mission area in support of Principle Operational Partner. This effort includes predictive capability.
	• Provide DOE/NNSA technical assistance for the planning, execution, and evaluation of national level exercises, including but not limited to: Marble Challenge, Nuclear Weapons Accident/Incident Exercises (NUWAIX), and other DOD-led exercises in which DOE/NNSA is not the lead.
		• The request provides funding for highly secure communications capabilities and associated personnel required to support response to a potential weapon of mass destruction (WMD) device. The mobile communications platform is already employed by DOE mission partners at DOD and FBI, and will allow seamless communications between the operational team at an incident site, scientific technical reachback advice, law enforcement, and the Intelligence Community.
		• The Request enables procurement of mission critical equipment that has exceeded its useful life. In order to continue to provide best available technology to field response teams and home teams, NNSA plans to address its extensive list of medium-to-high priority equipment recapitalization needs including:
		  ◦ High resolution spectroscopic identification systems
		  ◦ Radiography equipment
		  ◦ The next generation neutron multiplicity detector

FY 2016 Enacted	FY 2018 Request	Explanation of Changes FY 2018 vs FY 2016
Other Assets	**Other Assets**	**Other Assets**
• Maintained training for the Consequence Management response teams and home teams. • Sustained data communications systems for communications between the field teams and home teams. • Facilitated radiological response and recovery efforts in the event of the intentional or accidental release of radiological or nuclear material. • Informed public health officials on evacuation guidance and health effects from the accidental or intentional release of radiological materials. • Worked jointly with the federal coordinating agency, which is usually DHS/FEMA, during any radiological accident or incident. • Coordinated with the EPA/NRC and other elements within DOE, and provide support to the NEST programs to safeguard the public and environment to ensure the successful resolution of an accident or incident. • Began recapitalization of critical incident response equipment that is beyond its planned life cycle.	• Maintain training for the Consequence Management response teams and home teams. • Sustain data communications systems for communications between the field teams and home teams. • Facilitate radiological response and recovery efforts in the event of the intentional or accidental release of radiological or nuclear material. • Inform public health officials on evacuation guidance and health effects from the accidental or intentional release of radiological materials. • Work jointly with the federal coordinating agency, which is usually DHS/FEMA, during any radiological accident or incident. • Coordinate with the EPA/NRC and other elements within DOE, and provide support to the NEST programs to safeguard the public and environment to ensure the successful resolution of an accident or incident. • Continue recapitalization efforts for critical incident response equipment that is beyond its planned life cycle.	• The Request enables procurement of mission critical equipment that has exceeded its useful life. In order to continue to provide best available technology to field response teams and home teams, NNSA plans to address its extensive list of medium-to-high priority equipment recapitalization needs, including Consequence Management survey equipment.
Stabilization Operations	**Stabilization Operations**	**Stabilization Operations**
• Sustained capability for existing stabilization cities including training and equipment maintenance. Deployed to additional cities and upgraded specialized technical equipment, as needed, according to the joint DOE-FBI plan.	• Sustain capability for existing stabilization cities including training and equipment maintenance. Deploy to additional cities and upgrade specialized technical equipment, as needed, according to the joint DOE-FBI plan.	• NNSA in partnership with the FBI, funding sustains radiological/nuclear device stabilization capabilities in selected cities, provides yearly recurring sustainment training and equipment maintenance, and expands to an additional city this year as mutually agreed to with FBI.

Nuclear Counterterrorism and Incident Response Program
National Technical Nuclear Forensics

Description

The National Technical Nuclear Forensics (NTNF) subprogram maintains the operational capability for the Pre-Detonation Device technical nuclear forensics program and provides operational support to the Post-Detonation and Bulk Special Nuclear Materials (SNM) Analysis technical nuclear forensics programs. The NTNF subprogram is an HSC/NSC sponsored policy initiative, which aims to establish missions, institutionalize roles and responsibilities, and enable operational support for pre-detonation and post-detonation nuclear forensics and attribution programs. This support includes, but is not limited, to training and exercises, equipment purchases and maintenance, logistics, technical integration, readiness to deploy pre- and post-detonation response teams, and readiness to conduct bulk actinide laboratory analysis.

National Technical Nuclear Forensics

Activities and Explanation of Changes

FY 2016 Enacted	FY 2018 Request	Explanation of Changes FY 2018 vs FY 2017
National Technical Nuclear Forensics $10,041,000	**National Technical Nuclear Forensics $14,600,000**	**National Technical Nuclear Forensics +$4,559,000**
• Provided technical and operational capabilities in support of the U.S. Government interagency NTNF program. • Maintained readiness to respond to pre- and post- detonation nuclear events. • Participated in two Ground Collection Task Force field exercises and one training event. • Fully supported Post-Detonation device reconstruction training and exercises. • Conducted two Disposition and Forensic Evaluation Analysis Team (DFEAT) exercises. • Continue preventative and corrective facility maintenance at P-Tunnel, NNSS for support to the Pre-Detonation Device Program. Addressed broader infrastructure improvements at the NNSS. • Developed LANL PF4 plans and procedures in support of DFEAT. • Maintained an objective operational capability for Bulk SNM Analysis Program (BSAP). • Led U.S. support to the US/UK Joint Working Group (JOWOG) 29 Nuclear Forensics User Group.	• Provide technical and operational capabilities in support of the U.S. Government interagency NTNF program. • Maintain readiness to respond to pre- and post-detonation nuclear events. • Participate in two Ground Collection Task Force field exercises and one training event. • Fully support two Post-Detonation device reconstruction training and exercises. • Conduct two DFEAT exercises. • Continue preventative and corrective facility maintenance at P-Tunnel, NNSS for support to the Pre-Detonation Device Program. Continue to address broader infrastructure improvements at the NNSS. • Continue LANL PF4/TA-55 plans and procedure development in support of Pre-Detonation Device Program requirements. • Maintain an objective operational capability for BSAP. • Lead U.S. support in the US/UK JOWOG 29 Nuclear Forensics User Group.	• Additional funding enables advancement of the device assessment/reconstruction capability, including operationalizing. • Funding reflects a transfer of nuclear forensics device modeling work within the NCTIR account, from NCT to Nuclear Forensics, which helps consolidate nuclear forensics enhancements with the office responsible for nuclear forensics.

Nuclear Counterterrorism and Incident Response Program
Counterterrorism Response and Capacity Building

Description

The Counterterrorism Response and Capacity Building subprogram mission is to strengthen preparedness and capabilities to respond to all radiological or nuclear incidents, accidents, and terror threats posing a potential risk to the United States territory, citizens, or its interests. To execute this mission, this sub-program works domestically with federal, state, and local officials across the United States to exercise and expand their knowledge and capabilities to contribute to the National response to a radiological or nuclear terrorist threat or incident in the United States. However as part of a robust strategy to protect America from potential radiological or nuclear threats, this program also cooperates with key foreign partners to enable their ability to effectively address radiological or nuclear incidents in their region--with or without U.S. involvement--as far from U.S. territory as possible.

The Counterterrorism Response and Capacity Building sub-program activities include technical exchanges, joint technical experiments, workshops, exercises, technical assistance and training, strategic dialogues with select partners, and the loan of nuclear incident response and emergency management equipment, as needed. These activities address the full range of potential radiological or nuclear threats: from terror threats to civil nuclear materials and facilities, global WMD threats, and foreign nuclear or radiological incidents and accidents. This sub-program annually assesses global security trends, risks, and requirements in order to plan, prioritize, and implement its radiological/nuclear counterterrorism and incident response joint activities.

These activities directly contribute to the U.S. Government's (USG)strategic objectives and international commitments related to WMD counterterrorism and counterproliferation, international nuclear emergency management and incident response, and domestic preparedness and response. This program reduces nuclear threats to the United States, our partners, and interests through three key activities:

- Providing technical support, training, equipment, exercises, and other development activities with priority partner nations or organizations to improve nuclear incident response capabilities, including: radiological search training and techniques, protocol development, technical advice, and associated equipment loans to address lost radiological or nuclear materials; communications systems, loans of radiation detection and monitoring equipment, and associated training and techniques for characterization of and response to radiological and nuclear terror acts, accidents, and incidents; sharing of nuclear preparedness and response best practices; protocols , equipment, and training for the effective early warning and notification of nuclear/radiological incidents or accidents; and operational support and training during foreign radiological/nuclear incidents and accidents, as needed.

- Conducting regular, interagency bilateral policy and technical exchanges with advanced civil nuclear states facing, like the United States, a shared threat of nuclear terrorism. Classified information-sharing agreements allow for comprehensive interagency exchanges on the evolving terror threat and emerging threats, policy and practical approaches and tools to reduce the threat, exchanges of best practices, and reciprocal training observers.

- Designing, developing, and conducting (in collaboration with other U.S. government partners) of domestic *Silent Thunder* table-top exercises for federal, state and local agencies with security and response functions at specific sites with radiological or nuclear materials; *Eminent Discovery* and other international tabletop exercises for officials with border security, counterterrorism, and nuclear security responsibilities to strengthen regional and foreign nation capabilities to identify and respond to nuclear or radiological terror threats; and counter-WMD workshops with USG and key foreign partners.

Counterterrorism Response and Capacity Building

Activities and Explanation of Changes

FY 2016 Enacted	FY 2018 Request	Explanation of Changes FY 2018 vs FY 2017
Counterterrorism Response and Capacity Building $7,256,000	**Counterterrorism Response and Capacity Building $8,100,000**	**Counterterrorism Response and Capacity Building +$844,000**

• Engaged additional high priority partners and two additional countries to strengthen their nuclear incident preparedness and response capabilities.
• Engaged in cooperation with two additional countries in strengthening their emergency management system.
• Developed, designed, organized, and conducted specialized nuclear incident response and emergency management training courses and programs to meet the specific emergency management needs of partner nations.
• Provided enhanced communication and radiation monitoring equipment, search capabilities and training, technical assistance and training to IAEA and foreign government emergency programs to address nuclear/radiological incidents.
• Supported development of a robust and harmonized international management system through conduct of specialized incident response activities, including developing emergency policy, plans, and procedures and radiological search, training, protocols and techniques.
• Conducted eight domestic *Silent Thunder* WMD counterterrorism tabletop exercises, three foreign *Eminent Discovery* tabletop exercises or WMD threat awareness workshops, and two classified Counterterrorism Security Dialogues to
	• Execute planned base program activities including strategic partnerships; improving foreign partners' incident preparedness and response capabilities; highest priority multilateral engagements; equipment loans; exercises; and technical exchanges including:
	  • Eight *Silent Thunder* domestic WMD counterterrorism tabletop exercises;
	  • Four *Eminent Discovery* international radiological/nuclear terrorism interdiction response tabletop exercises;
	  • Four bilateral incident preparedness and response workshops;
	  • One Technical Exchange Forum with domestic and international responders, to identify emerging global requirements;
	  • One joint technical experiment with a key foreign partner; and
	  • Four joint IAEA workshops on incident and nuclear security preparedness and response.
		• Changes reflect increased costs and requirements for foreign partner nuclear response capability improvements and enhanced critical incident response techniques and approaches. Specifically:
		  • Engagement of two new, priority partners to improve response capabilities for radiological/nuclear terror acts, accidents, or incidents.
		  • Conduct two additional *Eminent Discovery* international radiological/nuclear terrorism and interdiction tabletop exercises with countries facing elevated terror risks;
		• Continue support to the IAEA through the conduct of two additional operational assistance missions for Major Public Events; enable Other Than High Income foreign partner participation in joint IAEA workshops; support improvements in IAEA secure communications and assistance coordination for foreign radiological/nuclear security events.
		• Allows continuation or completion of key joint preparedness and incident response exchanges, exercises, and training with strategic interagency partners.

FY 2016 Enacted	FY 2018 Request	Explanation of Changes FY 2018 vs FY 2017
address evolving and emerging terrorism threats to nuclear materials and facilities.		

Nuclear Counterterrorism and Incident Response Program
Nuclear Counterterrorism (NCT) Assessment

Description

NCT Assessment serves as the primary U.S. government source of technical expertise on IND and other terrorist nuclear threats. The subprogram assesses potential pathways for terrorist groups to design and construct INDs, including the unauthorized use of foreign weapons or components; supports a broad range of operational render-safe activities, planning for counterterrorism and counterproliferation scenarios by the military and domestic agencies, and national policy initiatives to reduce risk. The NCT Assessment subprogram has developed specialized capabilities within the NNSA nuclear weapons design laboratories and production facilities to provide the necessary analysis, policy support, and contingency planning needed by the USG to counter the threat of a stolen, modified, or improvised nuclear weapon or potentially weaponized nuclear material. Additionally, NCT Assessment manages a program to protect exceptionally sensitive IND design information and assesses open source technical information that is potentially helpful to terrorists in order to shape our understanding of potential threats and better inform operations and policy.

This FY 2018 Budget Request supports high-precision threat device modeling and experiments, as well as validation of technologies to model disablement actions for field deployment. NCT Assessment continues a series of major experiments in support of an effort coordinated with DOD to develop, model, and validate render safe/render unusable tools, techniques, and procedures.

In support of national policy objectives and in partnership with DOD, NCT Assessment completes the campaign to explore innovative approaches for standoff disablement. NCT Assessment gathers existing experimental and other data, identifies information and modeling gaps, and improves the ability to predict the behavior of nuclear components, focusing on those not historically incorporated in U.S. stockpile weapons.

NCT Assessment also supports bilateral NTR collaborations between the United States and the United Kingdom and France to ensure a secure and effective exchange of best practices and classified technical information supporting technical responses to nuclear incidents. These activities are coordinated within the U.S. interagency process to ensure maximum alignment with agreed-upon joint goals and ongoing programs.

Nuclear Counterterrorism Assessment

Activities and Explanation of Changes

FY 2016 Enacted	FY 2018 Request	Explanation of Changes FY 2018 vs FY 2017
Nuclear Counterterrorism Assessment $57,789,000	**Nuclear Counterterrorism Assessment $58,100,000**	**Nuclear Counterterrorism Assessment +$311,000**
• Increased activities for threat device modeling and experiments, as well as development and testing of render safe tools. • Completed execution of the first phase of the Tier Threat Modeling Archive-Validation project. • Executed a full range of standoff disablement experiments and modeling activities. This included a wide array of new experimental and complex modelling efforts designed to advise USG policies through our scientific and technical insights on a range of contingency options. • Supported international collaboration activities through the NTR and P3 channels to conduct evaluations of nuclear terrorism risks and scenarios, as well as materials attractiveness studies under the US/Japan Nuclear Security Working Group. • Continued to manage the assessment of open source NTD information.	• Complete standoff disablement assessment campaign. • Perform high-precision threat device modeling and experiments. • Continue a series of major experiments in support of the Tier Threat Modeling Archive Validation project. • Conduct technical assessments in support of USG nuclear material security efforts.	• Reflects a transfer of nuclear forensics post-detonation device modeling work within the NCTIR account, from NCT Assessment to Nuclear Forensics, which helps consolidate nuclear forensics enhancements with the office responsible for nuclear forensics. • Reflects additional efforts in IND technical assessments, to include additional material attractiveness assessments, in support of USG nuclear security.

Nuclear Counterterrorism and Incident Response Program
Performance Measures

In accordance with the GPRA Modernization Act of 2010, the Department sets targets for, and tracks progress toward, achieving performance goals for each program.

	FY 2016	FY 2017	FY 2018
Performance Goal (Measure)	**Emergency Operations Compliance Rate (EOCR) -** Emergency Operations Compliance Rate (EOCR) measures the rate of Defense Nuclear Facility sites in full compliance with DOE 0 151.ID.		
Target	N/A	75 %	95 %
Result	N/A	TBD	TBD
Endpoint Target	Maintain an annual rate of 95% of DNF sites in full compliance with DOE 0 151.lD.		
Performance Goal (Measure)	**Emergency Operations Readiness Index (EORI) -** Emergency Operations Readiness Index (EORI) measures the overall organizational readiness to respond to and mitigate radiological or nuclear incidents worldwide. (This index is measured from 1 to 100 with higher numbers meaning better readiness--the first three quarters will be expressed as the readiness at those given points in time, whereas the year end will be expressed as the average readiness for the year's four quarters).		
Target	91 EORI	N/A	N/A
Result	Not Met – 89	N/A	N/A
Endpoint Target	Annually maintain a Readiness Index of 91 or higher.		
Performance Goal (Measure)	**Incident Response Readiness Index (IRRI) -** IRRI tracks the overall organizational readiness to respond to and mitigate radiological or nuclear incidents worldwide.		
Target	N/A	91 IRRI Index	91 IRRI Index
Result	N/A	TBD	TBD
Endpoint Target	Annually, maintain an Emergency Operations Readiness Index of 91 or higher.		

	FY 2016	FY 2017	FY 2018
Performance Goal (Measure)	**Tier Threat Modeling Archive - Validation (TTMA-V) -** Percent complete toward validating national 3-D predictive modeling capability using four different experimental series designed to produce data needed to reconstruct nuclear threat device emergency disablement scenarios.		
Target	35 %	50 %	65 %
Result	Met - 35	TBD	TBD
Endpoint Target	By the end of FY 2020, complete the validation of the national 3-D predictive modeling capability using four different experimental series designed to produce data needed to reconstruct nuclear threat device emergency disablement scenarios. TTMA-V is a cornerstone joint project for the Joint Disablement Campaign that will build confidence in the models used to develop key products throughout the interagency to include assessments, tool development support, and procedure development. Follow-on projects are identified but must wait for the refinements this project will produce. This effort is coordinated with the Defense Threat Reduction Agency. Note: Due to congressional funding provided in FY 2014 and FY 2015, these activities were not executed; the experimental validation test series was delayed two years. A change request for the FY 2015 through FY 2020 targets was approved to reflect the funding reduction.		
Performance Goal (Measure)*Pending	**WMD Counterterrorism Expertise -** Cumulative number of officials trained in Weapons of Mass Destruction (WMD) Counterterrorism (CT) prevention and response via Office of Counterterrorism Policy and cooperation exercises.		
Target	11,700 trained personnel	12,500 trained personnel	13,300 trained personnel
Result	Met - 11,700	TBD	TBD
Endpoint Target	By the end of FY 2020, train 14,800 officials in Weapons of Mass Destruction (WMD) Counterterrorism (CT) prevention and response. Note: The Office of Counterterrorism Policy and Cooperation's Weapons of Mass Destruction (WMD) Counterterrorism Exercise Program designs, produces, and conducts tailor-made tabletop exercises for domestic public and private sector customers with nuclear or radioactive materials or associated nuclear security responsibilities. Internationally, the program works with key foreign partners to design, develop, and conduct National and regional WMD security and WMD counterterrorism tabletop exercises. Designed to build teamwork and an in-depth understanding of the roles and responsibilities of agencies charged with responding to terrorist-related radiological, nuclear, or WMD-related incidents, these exercises bring together Federal/National, State, and local decision-makers and first responders. This metric provides a quantitative (cumulative number of officials trained) measure of this program's impact.		

Nuclear Counterterrorism and Incident Response Program
Capital Summary

(Dollars in Thousands)

	Total	Prior Years	FY 2016 Enacted	FY 2016 Current	FY 2017 Annualized CR*	FY 2018 Request	FY 2018 vs FY 2016	Outyears to Completion
Capital Operating Expenses Summary (including Major Items of Equipment (MIE))								
Capital Equipment >$500K (including MIE)	N/A	N/A	2,000	2,000	2,044	2,089	+89	N/A
Plant Projects (GPP and IGPP)	N/A	N/A	787	787	804	822	35	N/A
Total, Capital Operating Expenses	**N/A**	**N/A**	**2,787**	**2,787**	**2,848**	**2,911**	**+124**	N/A
Capital Equipment > $500K (including MIE)								
Total Non-MIE Capital Equipment	N/A	N/A	2,000	2,000	2,044	2,089	+89	3,174
Total, Capital Equipment (including MIE)	**N/A**	**N/A**	**2,000**	**2,000**	**2,044**	**2,089**	**+89**	**3,174**
Plant Projects (GPP and IGPP)								
Total Plant Projects (GPP/IGPP) (Total Estimated Cost (TEC) <$5M)	N/A	N/A	787	787	804	822	+35	0
Total, Plant Projects (GPP/IGPP)	**N/A**	**N/A**	**787**	**787**	**804**	**822**	**+35**	**0**
Total, Capital Summary	**N/A**	**N/A**	**2,787**	**2,787**	**2,848**	**2,911**	**+159**	**3,174**

* The FY 2017 Annualized CR amounts reflect the P.L. 114-254 continuing resolution level annualized to a full year. These amounts are shown only at the congressional control level and above, below that level, a dash (-) is shown.

Department Of Energy

FY 2018 Congressional Budget

Funding By Appropriation By Site

($K)

Defense Nuclear Nonproliferation	**FY 2016 Enacted**	**FY 2017 Annualized CR**	**FY 2018 Request**
Argonne National Laboratory			
Nonproliferation and Verification R&D			
Nonproliferation and Verification R&D	0	0	0
Defense Nuclear Nonproliferation R&D			
Defense Nuclear Nonproliferation R&D	4,072	4,913	5,294
Nonproliferation and International Security			
Nonproliferation and International Security	0	0	0
Nuclear Counterterrorism and Incident Response			
Nuclear Counterterrorism Incident Response	2,764	2,751	3,371
Global Material Security			
Global Material Security	1,143	1,298	1,285
Material Management and Minimization			
Material Management and Minimization	32,560	26,902	25,536
Nonproliferation and Arms Control			
Nonproliferation and Arms Control	8,657	9,277	9,363
Total, Argonne National Laboratory	**49,196**	**45,141**	**44,849**
Brookhaven National Laboratory			
Nonproliferation and Verification R&D			
Nonproliferation and Verification R&D	0	0	0
Defense Nuclear Nonproliferation R&D			
Defense Nuclear Nonproliferation R&D	2,542	2,532	2,729
Nonproliferation and International Security			
Nonproliferation and International Security	0	0	0
Nuclear Counterterrorism and Incident Response			
Nuclear Counterterrorism Incident Response	2,670	1,999	2,310
Global Material Security			
Global Material Security	1,344	792	546
Material Management and Minimization			
Material Management and Minimization	703	781	593
Nonproliferation and Arms Control			
Nonproliferation and Arms Control	4,067	3,785	3,820
Total, Brookhaven National Laboratory	**11,326**	**9,889**	**9,998**

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($K)

Defense Nuclear Nonproliferation	**FY 2016 Enacted**	**FY 2017 Annualized CR**	**FY 2018 Request**
Idaho National Laboratory			
Nonproliferation and Verification R&D			
Nonproliferation and Verification R&D	0	0	0
Defense Nuclear Nonproliferation R&D			
Defense Nuclear Nonproliferation R&D	5,857	6,333	6,825
Nonproliferation and International Security			
Nonproliferation and International Security	0	0	0
Nuclear Counterterrorism and Incident Response			
Nuclear Counterterrorism Incident Response	3,455	3,005	3,473
Global Material Security			
Global Material Security	4,695	15,630	10,214
Material Management and Minimization			
Material Management and Minimization	106,643	44,784	48,989
Nonproliferation and Arms Control			
Nonproliferation and Arms Control	2,475	2,245	2,266
Total, Idaho National Laboratory	**123,125**	**71,997**	**71,767**
Kansas City National Security Complex (KCNSC)			
Defense Nuclear Nonproliferation R&D			
Defense Nuclear Nonproliferation R&D	296	373	402
Nonproliferation and International Security			
Nonproliferation and International Security	0	0	0
Nuclear Counterterrorism and Incident Response			
Nuclear Counterterrorism Incident Response	17,972	17,201	19,736
Nonproliferation and Arms Control			
Nonproliferation and Arms Control	1,684	2,245	2,266
Total, Kansas City National Security Complex (KCNSC)	**19,952**	**19,819**	**22,404**
Lawrence Berkeley National Laboratory			
Nonproliferation and Verification R&D			
Nonproliferation and Verification R&D	0	0	0
Defense Nuclear Nonproliferation R&D			
Defense Nuclear Nonproliferation R&D	6,502	8,118	8,749
Nonproliferation and International Security			
Nonproliferation and International Security	0	0	0
Nuclear Counterterrorism and Incident Response			
Nuclear Counterterrorism Incident Response	0	545	630
Nonproliferation and Arms Control			
Nonproliferation and Arms Control	0	846	854
Total, Lawrence Berkeley National Laboratory	**6,502**	**9,509**	**10,233**

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($K)

Defense Nuclear Nonproliferation	FY 2016 Enacted	FY 2017 Annualized CR	FY 2018 Request
Lawrence Livermore National Laboratory			
Nonproliferation and Verification R&D			
Nonproliferation and Verification R&D	0	0	0
Defense Nuclear Nonproliferation R&D			
Defense Nuclear Nonproliferation R&D	34,101	45,496	49,031
Nonproliferation and International Security			
Nonproliferation and International Security	0	0	0
Nuclear Counterterrorism and Incident Response			
Nuclear Counterterrorism Incident Response	40,510	38,306	44,224
Global Material Security			
Global Material Security	10,190	12,177	7,287
Nonproliferation and Arms Control			
Nonproliferation and Arms Control	18,202	16,605	16,757
Total, Lawrence Livermore National Laboratory	**103,003**	**112,584**	**117,299**
Los Alamos National Laboratory			
Nonproliferation and Verification R&D			
Nonproliferation and Verification R&D	0	0	0
Defense Nuclear Nonproliferation R&D			
Defense Nuclear Nonproliferation R&D	95,711	108,781	114,234
Nonproliferation and International Security			
Nonproliferation and International Security	0	0	0
Nuclear Counterterrorism and Incident Response			
Nuclear Counterterrorism Incident Response	40,739	41,251	47,671
Global Material Security			
Global Material Security	31,860	33,458	30,726
Material Management and Minimization			
Material Management and Minimization	28,065	20,898	44,169
Nonproliferation and Arms Control			
Nonproliferation and Arms Control	23,425	23,272	23,484
Total, Los Alamos National Laboratory	**219,800**	**227,660**	**260,284**
Nevada Field Office			
Nuclear Counterterrorism and Incident Response			
Nuclear Counterterrorism Incident Response	0	410	474
Total, Nevada Field Office	**0**	**410**	**474**

Department Of Energy

FY 2018 Congressional Budget

Funding By Appropriation By Site

($K)

Defense Nuclear Nonproliferation	FY 2016 Enacted	FY 2017 Annualized CR	FY 2018 Request
Nevada National Security Site			
Nonproliferation and Verification R&D			
Nonproliferation and Verification R&D	0	0	0
Defense Nuclear Nonproliferation R&D			
Defense Nuclear Nonproliferation R&D	60,056	23,472	25,295
Nonproliferation and International Security			
Nonproliferation and International Security	0	0	0
Nuclear Counterterrorism and Incident Response			
Nuclear Counterterrorism Incident Response	47,064	45,425	55,212
Global Material Security			
Global Material Security	2,105	655	657
Nonproliferation and Arms Control			
Nonproliferation and Arms Control	600	1,029	1,038
Total, Nevada National Security Site	**109,825**	**70,581**	**82,202**
New Brunswick Laboratory			
Nonproliferation and International Security			
Nonproliferation and International Security	0	0	0
Global Material Security			
Global Material Security	0	241	87
Nonproliferation and Arms Control			
Nonproliferation and Arms Control	272	139	140
Total, New Brunswick Laboratory	**272**	**380**	**227**
NNSA Albuquerque Complex			
Nonproliferation and Verification R&D			
Nonproliferation and Verification R&D	0	0	0
Defense Nuclear Nonproliferation R&D			
Defense Nuclear Nonproliferation R&D	38,310	33,172	35,749
Nonproliferation and International Security			
Nonproliferation and International Security	0	0	0
Nuclear Counterterrorism and Incident Response			
Nuclear Counterterrorism Incident Response	975	650	543
Global Material Security			
Global Material Security	54,344	86,901	85,417
Material Management and Minimization			
Material Management and Minimization	19,755	20,190	20,750
Nonproliferation and Arms Control			
Nonproliferation and Arms Control	1,645	2,417	2,439
Total, NNSA Albuquerque Complex	**115,029**	**143,330**	**144,898**

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($K)

Defense Nuclear Nonproliferation	FY 2016 Enacted	FY 2017 Annualized CR	FY 2018 Request
NNSA Production Site Office			
Material Management and Minimization			
Material Management and Minimization	3,890	10,451	25,768
Total, NNSA Production Site Office	**3,890**	**10,451**	**25,768**
Oak Ridge Institute for Science & Education			
Nuclear Counterterrorism and Incident Response			
Nuclear Counterterrorism Incident Response	10,510	2,924	3,379
Global Material Security			
Global Material Security	0	560	201
Total, Oak Ridge Institute for Science & Education	**10,510**	**3,484**	**3,580**
Oak Ridge National Laboratory			
Nonproliferation and Verification R&D			
Nonproliferation and Verification R&D	0	0	0
Defense Nuclear Nonproliferation R&D			
Defense Nuclear Nonproliferation R&D	21,250	23,271	25,079
Nonproliferation and International Security			
Nonproliferation and International Security	0	0	0
Nuclear Counterterrorism and Incident Response			
Nuclear Counterterrorism Incident Response	3,268	3,700	3,944
Global Material Security			
Global Material Security	25,443	26,517	14,840
Material Management and Minimization			
Material Management and Minimization	8,977	10,489	6,384
Nonproliferation and Arms Control			
Nonproliferation and Arms Control	22,087	19,218	19,393
Total, Oak Ridge National Laboratory	**81,025**	**83,195**	**69,640**
Office of Scientific & Technical Information			
Nonproliferation and Verification R&D			
Nonproliferation and Verification R&D	0	0	0
Defense Nuclear Nonproliferation R&D			
Defense Nuclear Nonproliferation R&D	16	29	32
Total, Office of Scientific & Technical Information	**16**	**29**	**32**

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Funding By Appropriation By Site

($K)

Defense Nuclear Nonproliferation	**FY 2016 Enacted**	**FY 2017 Annualized CR**	**FY 2018 Request**
Pacific Northwest National Laboratory			
Nonproliferation and Verification R&D			
Nonproliferation and Verification R&D	0	0	0
Defense Nuclear Nonproliferation R&D			
Defense Nuclear Nonproliferation R&D	22,280	27,112	29,218
Nonproliferation and International Security			
Nonproliferation and International Security	0	0	0
Nuclear Counterterrorism and Incident Response			
Nuclear Counterterrorism Incident Response	3,217	3,455	4,888
Global Material Security			
Global Material Security	223,837	160,323	114,639
Material Management and Minimization			
Material Management and Minimization	22,977	21,343	27,842
Nonproliferation and Arms Control			
Nonproliferation and Arms Control	18,613	20,809	21,000
Total, Pacific Northwest National Laboratory	**290,924**	**233,042**	**197,587**
Pantex Plant			
Nonproliferation and Verification R&D			
Nonproliferation and Verification R&D	0	0	0
Defense Nuclear Nonproliferation R&D			
Defense Nuclear Nonproliferation R&D	2,000	0	0
Nonproliferation and International Security			
Nonproliferation and International Security	0	0	0
Nuclear Counterterrorism and Incident Response			
Nuclear Counterterrorism Incident Response	1,357	1,313	1,516
Material Management and Minimization			
Material Management and Minimization	3,468	1,000	1,000
Nonproliferation and Arms Control			
Nonproliferation and Arms Control	400	134	135
Total, Pantex Plant	**7,225**	**2,447**	**2,651**
Princeton Plasma Physics Laboratory			
Defense Nuclear Nonproliferation R&D			
Defense Nuclear Nonproliferation R&D	0	105	113
Total, Princeton Plasma Physics Laboratory	**0**	**105**	**113**
Richland Operations Office			
Nuclear Counterterrorism and Incident Response			
Nuclear Counterterrorism Incident Response	1,425	1,508	1,743
Total, Richland Operations Office	**1,425**	**1,508**	**1,743**

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($K)

Defense Nuclear Nonproliferation	**FY 2016 Enacted**	**FY 2017 Annualized CR**	**FY 2018 Request**
Sandia National Laboratories			
Nonproliferation and Verification R&D			
Nonproliferation and Verification R&D	0	0	0
Defense Nuclear Nonproliferation R&D			
Defense Nuclear Nonproliferation R&D	79,879	95,457	105,874
Nonproliferation and International Security			
Nonproliferation and International Security	0	0	0
Nuclear Counterterrorism and Incident Response			
Nuclear Counterterrorism Incident Response	36,317	39,089	45,172
Global Material Security			
Global Material Security	52,918	61,640	48,265
Material Management and Minimization			
Material Management and Minimization	727	1,439	1,882
Nonproliferation and Arms Control			
Nonproliferation and Arms Control	7,671	6,989	7,053
Total, Sandia National Laboratories	**177,512**	**204,614**	**208,246**
Savannah River National Laboratory			
Nonproliferation and Verification R&D			
Nonproliferation and Verification R&D	0	0	0
Defense Nuclear Nonproliferation R&D			
Defense Nuclear Nonproliferation R&D	6,065	5,107	5,504
Total, Savannah River National Laboratory	**6,065**	**5,107**	**5,504**
Savannah River Operations Office			
Global Material Security			
Global Material Security	182	470	169
Material Management and Minimization			
Material Management and Minimization	3,824	870	2,950
Nonproliferation Construction			
Nonproliferation Construction	330,000	326,000	260,000
Total, Savannah River Operations Office	**334,006**	**327,340**	**263,119**

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Funding By Appropriation By Site

($K)

Defense Nuclear Nonproliferation	**FY 2016 Enacted**	**FY 2017 Annualized CR**	**FY 2018 Request**
Savannah River Site			
Nonproliferation and International Security			
Nonproliferation and International Security	0	0	0
Nuclear Counterterrorism and Incident Response			
Nuclear Counterterrorism Incident Response	2,110	2,398	2,771
Material Management and Minimization			
Material Management and Minimization	41,022	41,588	66,607
Nonproliferation and Arms Control			
Nonproliferation and Arms Control	5,210	3,959	3,995
Nonproliferation Construction			
Nonproliferation Construction	10,000	9,622	19,000
Total, Savannah River Site	**58,342**	**57,567**	**92,373**
Washington Headquarters			
Nonproliferation and Verification R&D			
Nonproliferation and Verification R&D	0	0	0
Defense Nuclear Nonproliferation R&D			
Defense Nuclear Nonproliferation R&D	39,598	27,187	29,300
Nonproliferation and International Security			
Nonproliferation and International Security	0	0	0
Nuclear Counterterrorism and Incident Response			
Nuclear Counterterrorism Incident Response	17,508	22,795	33,246
Legacy Contractor Pensions			
Legacy Contractor Pensions	94,617	93,399	40,950
Global Material Security			
Global Material Security	10,664	9,876	13,271
Material Management and Minimization			
Material Management and Minimization	4,312	73,582	13,252
Nonproliferation and Arms Control			
Nonproliferation and Arms Control	14,422	14,468	14,601
Total, Washington Headquarters	**181,121**	**241,307**	**144,620**
Waste Isolation Pilot Plant			
Nuclear Counterterrorism and Incident Response			
Nuclear Counterterrorism Incident Response	51	20	23
Total, Waste Isolation Pilot Plant	**51**	**20**	**23**
Y-12 National Security Complex			
Nonproliferation and International Security			
Nonproliferation and International Security	0	0	0
Total, Y-12 National Security Complex	**0**	**0**	**0**

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($K)

Defense Nuclear Nonproliferation	**FY 2016 Enacted**	**FY 2017 Annualized CR**	**FY 2018 Request**
Y-12 Site Office			
Nonproliferation and Verification R&D			
Nonproliferation and Verification R&D	0	0	0
Defense Nuclear Nonproliferation R&D			
Defense Nuclear Nonproliferation R&D	798	2,475	2,667
Nuclear Counterterrorism and Incident Response			
Nuclear Counterterrorism Incident Response	2,478	2,627	3,034
Global Material Security			
Global Material Security	8,026	10,717	9,504
Material Management and Minimization			
Material Management and Minimization	39,661	38,190	46,372
Nonproliferation and Arms Control			
Nonproliferation and Arms Control	773	1,089	1,099
Total, Y-12 Site Office	**51,736**	**55,098**	**62,676**
Total, Defense Nuclear Nonproliferation	**1,961,878**	**1,936,614**	**1,842,310**

Naval Reactors

Naval Reactors

Naval Reactors
Proposed Appropriation Language

For Department of Energy expenses necessary for naval reactors activities to carry out the Department of Energy Organization Act (42 U.S.C. 7101 et seq.), including the acquisition (by purchase, condemnation, construction, or otherwise) of real property, plant, and capital equipment, facilities, and facility expansion, $1,479,751,000, to remain available until expended: Provided, That of such amount, $48,200,000 shall be available until September 30, 2019, for program direction.

Note.—A full-year 2017 appropriation for this account was not enacted at the time the budget was prepared; therefore, the budget assumes this account is operating under the Further Continuing Appropriations Act, 2017 (P.L. 114–254). The amounts included for 2017 reflect the annualized level provided by the continuing resolution.

Explanation of Changes

Change from the language proposed in FY 2016 consists of a change to the requested funding amount and time availability of program direction funding.

Public Law Authorizations

- P.L. 83-703, "Atomic Energy Act of 1954"
- "Executive Order 12344 (42 U.S.C. 7158), "Naval Nuclear Propulsion Program"
- P.L. 106-65, National Nuclear Security Administration Act, as amended
- P.L. 114-328, National Defense Authorization Act for Fiscal Year 2017

Naval Reactors

(Dollars in Thousands)

	FY 2016 Enacted	FY 2017 Annualized CR*	FY 2018 Request	FY 2018 vs FY 2016
Naval Reactors	1,375,496	1,372,881	1,479,751	+104,255
Total, Naval Reactors	**1,375,496**	**1,372,881**	**1,479,751**	**+104,255**

* The FY 2017 Annualized CR amounts reflect the P.L. 114-254 continuing resolution level annualized to a full year. These amounts are shown only at the congressional control level and above, below that level, a dash (-) is shown.

Overview

The Naval Reactors (NR) appropriation includes funding for activities that respond directly to the National Security Strategy of the United States, and are central to the Department of Energy's pursuit to provide safe and effective integrated nuclear propulsion systems for the U.S. Navy. Specifically, NR is responsible for U.S. Navy nuclear propulsion work, beginning with reactor plant technology development and design, continuing through reactor plant operation and maintenance, and ending with final disposition of naval spent nuclear fuel. The program ensures the safe and reliable operation of reactor plants in nuclear-powered submarines and aircraft carriers (constituting over 45 percent of the Navy's major combatants) and fulfills the Navy's requirements for new nuclear propulsion plants that meet current and future national defense requirements.

Naval Reactors' mission includes ensuring the safety of reactors and associated naval nuclear propulsion plants, and control of radiation and radioactivity associated with naval nuclear propulsion activities, including prescribing and enforcing standards and regulations for these areas, as they affect the environment and the safety and health of workers, operators, and the general public. Naval Reactors maintains oversight in areas such as security, nuclear safeguards and transportation, radiological controls, public information, procurement, logistics, and fiscal management.

As part of the National Nuclear Security Administration (NNSA), Naval Reactors is working to provide the U.S. Navy with nuclear propulsion plants that are capable of responding to the challenges of the 21st century security environment.

Highlights and Major Changes in the FY 2018 Budget Request

Naval Reactors' request of $1,479,751,000 in fiscal year 2018 is for continued achievement of its core objective of ensuring the safe and reliable operation of the Nation's nuclear fleet.

Department of Energy (DOE) Working Capital Fund (WCF) Support

The Naval Reactors appropriation projected contribution to the DOE WCF for FY 2018 is $3,932,000. This funding covers certain shared enterprise activities including managing enterprise-wide systems and data, telecommunications and supporting the integrated acquisition environment.

Contractor Pensions

In FY 2018, for the Bettis and Knolls Laboratories, Naval Reactors' planned DOE-funded qualified contractor pension contribution is $36,600,000 and non-qualified contractor pension contribution is $1,119,377.

Rickover Fellowship Program

NR manages the fellowship to attract and develop technical leaders in the areas of reactor technology and design as it pertains to naval nuclear propulsion. NR anticipates spending $995,506 in FY 2018 to support this program.

Naval Reactors
Funding by Congressional Control

	(Dollars in Thousands)			
	FY 2016 Enacted	**FY 2017 Annualized CR***	**FY 2018 Request**	**FY 2018 vs FY 2016**
Naval Reactors				
Naval Reactors Operations and Infrastructure	445,196	444,350	466,884	+21,688
Naval Reactors Development	446,896	446,046	473,267	+26,371
S8G Prototype Refueling	133,000	132,747	190,000	+57,000
Columbia-Class Reactor Systems Development (formerly *Ohio* Replacement Reactor Systems Development)	186,800	186,445	156,700	-30,100
Program Direction	42,504	42,423	48,200	+5,696
Construction	121,100	120,870	144,700	+23,600
Total, Naval Reactors	**1,375,496**	**1,372,881**	**1,479,751**	**+104,255**

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Naval Reactors Funding

(Dollars in Thousands)

	FY 2016 Enacted	FY 2017 Annualized CR*	FY 2018 Request	FY 2018 vs FY 2016
Naval Reactors				
Naval Reactors Operations and Infrastructure				
Research Reactor Facility Operations & Maintenance	138,670	147,619	122,176	-16,494
MARF Defueling and Layup	0	0	4,200	+4,200
Laboratory Facility Regulation, Compliance, & Protection	93,046	91,803	117,642	+24,596
Nuclear Spent Fuel Management	133,767	128,671	132,604	-1,163
Radiological/Environmental Remediation & Demolition	59,168	50,652	67,862	+8,694
Capital Equipment	2,845	2,569	4,500	+1,655
General Plant Projects	17,700	23,036	17,900	+200
Total, Naval Reactors Operations and Infrastructure	**445,196**	**444,350**	**466,884**	**+21,688**
Naval Reactors Development				
Ship Construction & Maintenance Support	44,753	40,145	39,424	-5,329
Nuclear Reactor Technology	128,657	132,615	143,453	+14,796
Reactor Systems & Component Technology	180,271	192,407	195,690	+15,419
Advanced Test Reactor Operations	77,200	69,966	82,000	+4,800
Capital Equipment	16,015	10,913	12,700	-3,315
Total, Naval Reactors Development	**446,896**	**446,046**	**473,267**	**+26,371**
S8G Prototype Refueling	122,770	131,195	189,210	+66,440
Capital Equipment (MIE)	3,630	1,552	790	-2,840
General Plant Project (GPP)	6,600	0	0	-6,600
Total, S8G Protype Refueling	**133,000**	**132,747**	**190,000**	**+57,000**
***Columbia*-Class Reactor Systems Development (formerly *Ohio* Replacement Reactor Systems Development)**	**186,800**	**186,445**	**156,700**	**-30,100**
Program Direction	**42,504**	**42,423**	**48,200**	**+5,696**
Construction	**121,100**	**120,870**	**144,700**	**+23,600**
Total, Naval Reactors	**1,375,496**	**1,372,881**	**1,479,751**	**+104,255**

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Naval Reactors
Explanation of Major Changes
(Dollars in Thousands)

	FY 2018 vs FY 2016
Naval Reactors	
Naval Reactors Operations and Infrastructure: This increase (+5%) supports critical prototype maintenance, facility and systems maintenance, and regulatory requirements across the Program's four sites.	**+21,688**
Naval Reactors Development: This increase (+6%) supports unique technologies that are critical to delivering improvements in reactor performance and reliability and provides continuous support to U.S. Navy fleet operations, as well as additional funding for Advanced Test Reactor (ATR) operations and infrastructure sustainment.	**+26,371**
S8G Prototype Refueling: This increase (+43%) is consistent with the project's planned funding profile and supports availability planning, preparations, and staffing ramp up in advance of refueling overhaul start in September 2018.	**+57,000**
***Columbia*-Class Reactor Systems Development:** This decrease (-16%) is consistent with the project's planned funding profile and supports reactor plant system and long lead time component development to support FY 2019 procurement.	**-30,100**
Program Direction: This funding increase (+13%) supports an additional 8 FTEs, general inflationary increase for personnel and pay related costs and benefits, travel requirements, IT, and maintenance operations.	**+5,696**
Construction: This increase (+20%) matches NR's program of record as detailed in the Ten-Year Facilities Plan	**+23,600**
Total, Naval Reactors	**+104,255**

Naval Reactors
Performance Measures

In accordance with the GPRA Modernization Act of 2010, the Department sets targets for, and tracks progress toward, achieving performance goals for each program.

	FY 2016	FY 2017	FY 2018
Performance Goal (Measure)	**S1B Reactor Plant Design - Cumulative percentage of work complete on the *Columbia*-Class submarine reactor plant design.**		
Target	43 % complete	55 % complete	65 % complete
Result	Met - 45.3	TBD	TBD
Endpoint Target	By the end of FY 2027, complete 100% of the *Columbia*-Class submarine reactor plant design. Note: In FY 2013, DOD delayed construction start for the lead ship by two years (from FY 2019 to FY 2021) and reactor plant advanced procurement from FY 2017 to FY 2019. FY 2013 and out performance measure targets have been changed to reflect the delayed construction start.		

Naval Reactors
Program Direction

Description

Due to the essential nature of nuclear reactor work, Naval Reactors provides centrally controlled, technical management of program operations. Federal employees directly oversee fleet support and set policies and procedures for developing new reactor plants, operating existing reactor plants, facilities supporting these plants, contractors, and the Bettis and Knolls Atomic Power Laboratories. In addition, these employees interface with other DOE offices and local, state, and Federal regulatory agencies.

Naval Reactors' Federal employees are typically recruited from a community of highly trained military engineers who have completed a rigorous five-year on-the-job training program unique to Naval Reactors. This training program has groomed engineers with skill sets far beyond that of nuclear engineers found in the commercial and Federal sectors.

Travel funds are used to perform oversight activities of facilities located worldwide that require comprehensive audits and in-person visits to ensure compliance and safety. Additionally, Naval Reactors Representative positions at the field sites (to include locations in the United Kingdom, Japan, Hawaii, and the continental United States) rotate periodically due to retirements, attrition, and succession planning.

Other Related Expenses includes the maintenance of Naval Reactors' IT hardware, engineering software, working capital funding, and related licenses supporting mission-essential technical work. Additionally, these funds will support planned upgrades and maintenance of video teleconferencing equipment, security investigations of Federal personnel, and training requirements.

Highlights and Major Changes in the FY 2018 Budget Request

The Naval Reactors Program Direction FY 2018 budget increase over FY 2016 Enacted levels supports an additional 8 FTEs. Despite recent and planned retirements that have resulted in a loss of NR's engineering experience, in FY 2018 NR will continue to reshape the workforce to manage knowledge transfer to ensure the accomplishment of the NR mission.

Program Direction
Funding

	(Dollars in Thousands)			
	FY 2016 Enacted	FY 2017 Annualized CR*	FY 2018 Request	FY 2018 vs FY 2016
Naval Reactors				
Headquarters				
Salaries and Benefits	21,300	21,300	23,000	+1,700
Travel	200	200	1,100	+900
Other Related Expenses	2,054	1,973	3,400	+1,346
Total, Headquarters	**23,554**	**23,473**	**27,500**	**+3,946**
Naval Reactors Laboratory Field Office				
Salaries and Benefits	16,950	16,950	17,900	+950
Travel	800	800	900	+100
Other Related Expenses	1,200	1,200	1,900	+700
Total, Naval Reactors Laboratory Field Office	**18,950**	**18,950**	**20,700**	**+1,750**
Total Program Direction				
Salaries and Benefits	38,250	38,250	40,900	+2,650
Travel	1,000	1,000	2,000	+1,000
Other Related Expenses	3,254	3,173	5,300	+2,046
Total, Program Direction	**42,504**	**42,423**	**48,200**	**+5,696**
Federal FTEs	**238**	**238**	**246**	**+8**

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Other Related Expenses

	(Dollars in Thousands)			
	FY 2016 Enacted	**FY 2017 Annualized CR***	**FY 2018 Request**	**FY 2018 vs FY 2016**
Other Related Expenses				
Transportation	400	400	830	+430
Communications, Utilities and Miscellaneous Charges	200	200	430	+230
Other Services from Federal Sources	450	450	700	+250
Advisory and Assistance Services	150	150	180	+30
Operation and Maintenance of Facilities	200	200	260	+60
Operation and Maintenance of Equipment	350	350	660	+310
Supplies and Materials	220	220	280	+60
Equipment	484	403	1,080	+596
WCF	800	800	880	+80
Total, Other Related Expenses	**3,254**	**3,173**	**5,300**	**+2,046**

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Activities and Explanation of Changes

FY 2016 Enacted	FY 2018 Request	Explanation of Changes FY 2018 vs FY 2016
Salaries and Benefits $38,250,000	**Salaries and Benefits $40,900,000**	**Salaries and Benefits +$2,650,000**
• Federal salaries and benefits for employees that directly oversee fleet support and set policies and procedures for developing new reactor plants, operating existing reactor plants, facilities supporting these plants, contractors, and the Bettis and Knolls Atomic Power Laboratories.	• Federal salaries and benefits for employees that directly oversee fleet support and set policies and procedures for developing new reactor plants, operating existing reactor plants, facilities supporting these plants, contractors, and the Bettis and Knolls Atomic Power Laboratories.	• Reflects increase to support an additional 8 FTEs, general inflationary increase for personnel and pay related costs as well as anticipated costs of benefits.
Travel $1,000,000	**Travel $2,000,000**	**Travel +$1,000,000**
• Perform oversight activities of facilities located worldwide that require comprehensive audits and in-person visits to ensure compliance and safety. • Rotation of Naval Reactors Representatives at the field sites (U.K., Japan, Hawaii, and the continental United States) due to retirement, attrition, and succession planning.	• Perform oversight activities of facilities located worldwide that require comprehensive audits and in-person visits to ensure compliance and safety. • Rotation of Naval Reactors Representatives at the field sites (U.K., Japan, Hawaii, and the continental United States) due to retirement, attrition, and succession planning.	• Reflects expected travel requirement to execute oversight activities.
Other Related Expenses $3,254,000	**Other Related Expenses $5,300,000**	**Other Related Expenses +$2,046,000**
• Maintenance of Naval Reactors' IT hardware, engineering software, and related licenses supporting mission essential technical work. • Support planned upgrades and maintenance of video teleconferencing equipment, security investigation of federal personnel, and training requirements.	• Maintenance of Naval Reactors' IT hardware, engineering software, and related licenses supporting mission essential technical work. • Support planned upgrades and maintenance of video teleconferencing equipment, security investigation of federal personnel, and training requirements.	• Reflects increase to support IT and maintenance operations.

Naval Reactors
Capital Summary

(Dollars in Thousands)

	Total	Prior Years	FY 2016 Enacted	FY 2016 Current	FY 2017 Annualized CR*	FY 2018 Request	FY 2018 vs FY 2016	Outyears to Completion
Capital Operating Expenses Summary (including Major Items of Equipment (MIE))								
Capital Equipment >$500K (including MIE)	N/A	N/A	22,490	22,490	15,034	17,990	-4,500	27,000
Plant Projects (GPP and IGPP)	N/A	N/A	24,300	24,300	23,036	17,900	-6,400	211,331
Total, Capital Operating Expenses	**N/A**	**N/A**	**46,790**	**46,790**	**38,070**	**35,890**	**-10,900**	**238,331**
Capital Equipment > $500K (including MIE)								
Total Non-MIE Capital Equipment	N/A	N/A	7,860	7,860	9,334	11,700	+3,840	N/A
High Performance Computer (FY 2016 Buy)	11,000	0	11,000	11,000	0	0	-11,000	0
High Performance Computer (FY 2017 Buy)	5,500	0	0	0	5,500	0	0	0
High Performance Computer (FY 2018 Buy)	5,500	0	0	0	0	5,500	+5,500	0
Land-based Prototype Rod Control Equipment	10,500	8,700	1,800	1,800	0	0	-1,800	0
Land-Based Prototype Instrumentation and Control	18,020	15,200	1,830	1,830	200	790	-1,040	0
High Performance Computers (FY 2019 Buy)	5,500	0	0	0	0	0	0	5,500
High Performance Computers (FY 2020 Buy)	5,500	0	0	0	0	0	0	5,500
High Performance Computers (FY 2021 Buy)	5,500	0	0	0	0	0	0	5,500
High Performance Computers (FY 2022 Buy)	5,500	0	0	0	0	0	0	5,500
RML High Radiation Scanning Electron Microscope Replacement	5,000	0	0	0	0	0	0	5,000
Total, Capital Equipment (including MIE)	**N/A**	**N/A**	**22,490**	**22,490**	**15,034**	**17,990**	**-4,500**	**N/A**
Plant Projects (GPP and IGPP)								
Total Plant Projects (GPP/IGPP) (Total Estimated Cost (TEC) <$5M)	N/A	N/A	11,900	11,900	17,036	17,600	+5,700	85,210
NRF Vehicle Barrier System	6,000	0	0	0	6,000	0	0	0
NRF Security Upgrades	8,000	0	0	0	0	300	+300	7,700
KS Reactor Operations Support Building	9,000	3,200	5,800	5,800	0	0	-5,800	0
KS Prototype Overhaul Support Facility	6,600	0	6,600	6,600	0	0	-6,600	0
BL BRES / Fitness Center Complex	7,710	0	0	0	0	0	0	7,710
BL Training Facility	6,200	0	0	0	0	0	0	6,200
NRF Office Building #3	8,700	0	0	0	0	0	0	8,700

(Dollars in Thousands)

	Total	Prior Years	FY 2016 Enacted	FY 2016 Current	FY 2017 Annualized CR*	FY 2018 Request	FY 2018 vs FY 2016	Outyears to Completion
NRF Northeast Boundary Area	9,000	0	0	0	0	0	0	9,000
NRF HVAC Control Update	5,300	0	0	0	0	0	0	5,300
NRF ECF Rad Filtered Vent Upgrade	7,200	0	0	0	0	0	0	7,200
KL Crafts Facility	7,050	0	0	0	0	0	0	7,050
KL Legacy Eliminating Office Bldg	9,000	0	0	0	0	0	0	9,000
KL NDT Renovation	6,345	0	0	0	0	0	0	6,345
KL A1 Upgrades	9,000	0	0	0	0	0	0	9,000
KS Building 83 Upgrade	5,795	0	0	0	0	0	0	5,795
KS Natural Gas Infrastructure	7,151	0	0	0	0	0	0	7,151
KS Service Water and Sanitary Sewer Upgrade	5,255	0	0	0	0	0	0	5,255
KS Fire System Upgrade	8,060	0	0	0	0	0	0	8,060
KS Fire House Replacement	8,955	0	0	0	0	0	0	8,955
KS S8G Prototype Weather Resistant Enclosure	7,700	0	0	0	0	0	0	7,700
Total, Plant Projects (GPP/IGPP)	**N/A**	**N/A**	**24,300**	**24,300**	**23,036**	**17,900**	**-6,400**	**211,331**
Total, Capital Summary	**N/A**	**N/A**	**46,790**	**46,790**	**38,070**	**35,890**	**-10,900**	**238,331**

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Naval Reactors
Construction Projects Summary

(Dollars in Thousands)

	Total	Prior Years	FY 2016 Enacted	FY 2017 Enacted	FY 2018 Request	FY 2018 vs FY 2017
10-D-903, KS Security Upgrades						
Total Estimated Cost (TEC)	22,891	9,491	500	12,900	0	-12,900
Other Project Cost (OPC)	2,189	600	200	361	350	-11
TPC, 10-D-903, KS Security Upgrades	**25,080**	**10,091**	**700**	**13,261**	**350**	**-12,911**
14-D-901, Spent Fuel Handling Recapitalization Project						
Total Estimated Cost (TEC)	1,472,400	63,400	82,100	96,900	113,000	+16,100
Other Project Cost (OPC)	174,100	128,900	3,900	3,100	3,000	-100
TPC, 14-D-901, Spent Fuel Handling Recapitalization Project[a]	**1,646,500**	**192,300**	**86,000**	**100,000**	**116,000**	**+16,000**
14-D-902, KL Materials Characterization Laboratory						
Total Estimated Cost (TEC)	31,000	1,000	30,000	0	0	0
Other Project Cost (OPC)	7,282	4,330	1,120	150	1,500	+1,350
TPC, 14-D-902, KL Materials Characterization Laboratory	**38,282**	**5,330**	**31,120**	**150**	**1,500**	**+1,350**
15-D-902, KS Engineroom Team Trainer Facility						
Total Estimated Cost (TEC)	36,400	0	3,100	33,300	0	-33,300
Other Project Cost (OPC)	2,220	900	1,020	300	0	-300
TPC, 15-D-902, KS Engineroom Team Trainer Facility	**38,620**	**900**	**4,120**	**33,600**	**0**	**-33,600**

[a] The Consolidated and Further Continuing Appropriation Act, 2015 provided funding for Other Project Costs (OPC) within project funding beginning in FY 2015. All prior year funding was OPC.

Naval Reactors
Construction Projects Summary

(Dollars in Thousands)

	Total	Prior Years	FY 2016 Enacted	FY 2017 Enacted	FY 2018 Request	FY 2018 vs FY 2017
15-D-903, KL Fire System Upgrade						
Total Estimated Cost (TEC)	16,200	600	600	0	15,000	+15,000
Other Project Cost (OPC)	1,295	600	0	0	695	+695
TPC, 15-D-903, KL Fire System Upgrade	**17,495**	**1,200**	**600**	**0**	**15,695**	**+15,695**
15-D-904, NRF Overpack Storage Expansion 3						
Total Estimated Cost (TEC)	15,700	400	900	700	13,700	+13,000
Other Project Cost (OPC)	400	250	0	0	0	0
TPC, 15-D-904, NRF Overpack Storage Expansion 3	**16,100**	**650**	**900**	**700**	**13,700**	**+13,000**
17-D-911, BL Fire System Upgrade						
Total Estimated Cost (TEC)	14,600	0	0	1,400	0	-1,400
Other Project Cost (OPC)	1,500	700	250	250	0	-250
TPC, 17-D-911, BL Fire System Upgrade	**16,100**	**700**	**250**	**1,650**	**0**	**-1,650**
Total All Construction Projects						
Total Estimated Cost (TEC)	1,609,191	74,891	117,200	145,200	141,700	-3,500
Other Project Cost (OPC)	188,986	136,280	6,490	4,161	5,545	+1,384
TPC, All Construction Projects	**1,798,177**	**211,171**	**123,690**	**149,361**	**147,245**	**-2,116**

Outyears to Completion for Naval Reactors

	(Dollars in Thousands)				
	FY 2019 Request	FY 2020 Request	FY 2021 Request	FY 2022 Request	Outyears to Completion
10-D-903, KS Security Upgrades					
Total Estimated Cost (TEC)	0	0	0	0	0
Other Project Cost (OPC)	678	0	0	0	0
TPC, 10-D-903, KS Security Upgrades	**678**	**0**	**0**	**0**	**0**
14-D-901, Spent Fuel Handling Recapitalization Project					
Total Estimated Cost (TEC)	284,100	315,300	234,700	186,700	96,200
Other Project Cost (OPC)	2,900	3,700	4,300	6,300	18,000
TPC, 14-D-901, Spent Fuel Handling Recapitalization Project	**287,000**	**319,000**	**239,000**	**193,000**	**114,200**
14-D-902, KL Material Characterization Laboratory					
Total Estimated Cost (TEC)	0	0	0	0	0
Other Project Cost (OPC)	182	0	0	0	0
TPC, 14-D-902, KL Material Characterization Laboratory	**182**	**0**	**0**	**0**	**0**
15-D-904, NRF Overpack Storage Expansion 3					
Total Estimated Cost (TEC)	0	0	0	0	0
Other Project Cost (OPC)	150	0	0	0	0
TPC, 15-D-904, NRF Overpack Storage Expansion 3	**150**	**0**	**0**	**0**	**0**

Outyears to Completion for Naval Reactors

(Dollars in Thousands)

	FY 2019 Request	FY 2020 Request	FY 2021 Request	FY 2022 Request	Outyears to Completion
17-D-911, BL Fire System Upgrade					
Total Estimated Cost (TEC)	13,200	0	0	0	0
Other Project Cost (OPC)	0	0	300	0	0
TPC, 17-D-911, BL Fire System Upgrade	**13,200**	**0**	**300**	**0**	**0**
19-D-XXX, KS Overhead Piping					
Total Estimated Cost (TEC)	10,994	20,900	0	0	0
Other Project Cost (OPC)	5,114	0	2,490	55	55
TPC, 19-D-XXX, KS Overhead Piping	**16,108**	**20,900**	**2,490**	**55**	**55**
19-D-XXX, BL Component Test Complex					
Total Estimated Cost (TEC)	3,000	0	41,300	0	0
Other Project Cost (OPC)	100	0	300	8,300	0
TPC, 19-D-XXX, BL Component Test Complex	**3,100**	**0**	**41,600**	**8,300**	**0**
20-D-XXX, KL Fuel Development Laboratory					
Total Estimated Cost (TEC)	0	23,700	0	0	0
Other Project Cost (OPC)	0	1,244	148	0	0
TPC, 20-D-XXX, KL Fuel Development Laboratory	**0**	**24,944**	**148**	**0**	**0**
20-D-XXX, KL Chemistry and Radiological Health Building					
Total Estimated Cost (TEC)	0	2,900	0	38,720	0
Other Project Cost (OPC)	0	50	0	50	1,300
TPC, 20-D-XXX, KL Chemistry and Radiological Health Building	**0**	**2,950**	**0**	**38,770**	**1,300**

Outyears to Completion for Naval Reactors

(Dollars in Thousands)

	FY 2019 Request	FY 2020 Request	FY 2021 Request	FY 2022 Request	Outyears to Completion
20-D-XXX, NRF Boiler House					
Total Estimated Cost (TEC)	0	1,000	1,000	0	15,400
Other Project Cost (OPC)	100	0	0	0	800
TPC, 20-D-XXX, NRF Boiler House	**100**	**1,000**	**1,000**	**0**	**16,200**
21-D-XXX, NRF Medical Science Complex					
Total Estimated Cost (TEC)	0	0	30,800	0	0
Other Project Cost (OPC)	240	120	0	840	0
TPC, 21-D-XXX, NRF Medical Science Complex	**240**	**120**	**30,800**	**840**	**0**
22-D-XXX, KL Security Upgrades					
Total Estimated Cost (TEC)	0	0	0	2,100	24,530
Other Project Cost (OPC)	0	312	1,201	0	136
TPC, 22-D-XXX, KL Security Upgrades	**0**	**312**	**1,201**	**2,100**	**24,666**
22-D-XXX, NRF Production Maintenance Complex					
Total Estimated Cost (TEC)	0	0	0	2,000	40,000
Other Project Cost (OPC)	374	1,078	1,154	16	2,079
TPC, 22-D-XXX, NRF Production Maintenance Complex	**374**	**1,078**	**1,154**	**2,016**	**42,079**
Total All Construction Projects					
Total Estimated Cost (TEC)	311,294	363,800	307,800	229,520	176,130
Other Project Cost (OPC)	9,838	6,504	9,893	15,561	22,370
TPC, All Construction Projects	**321,132**	**370,304**	**317,693**	**245,081**	**198,500**

Research and Development

The Office of Management and Budget (OMB) Circular No. A-11, “Preparation, Submission, and Execution of the Budget,” dated July 2013, requires the reporting of research and development (R&D) data. Consistent with this requirement, R&D activities funded by NNSA are displayed below.

(Dollars in Thousands)

	FY 2016 Enacted	FY 2017 Annualized CR*	FY 2018 Request	FY 2018 vs FY 2016
Research and Development (R&D)				
Basic	0	0	0	0
Applied	0	0	0	0
Development	1,207,606	1,213,941	1,299,161	+91,555
Subtotal, R&D	**1,207,606**	**1,213,941**	**1,299,161**	**+91,555**
Equipment	22,490	15,034	17,990	-4,500
Construction	145,400	143,906	162,600	17,200
Total, R&D	**1,375,496**	**1,372,881**	**1,479,751**	**+104,255**

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15-D-904, NRF Overpack Storage Expansion 3
Naval Reactors Facility, Idaho
Project is for Design and Construction

Significant Changes and Summary

Significant Changes

This Construction Project Data Sheet (CPDS) is an update of the FY 2017 CPDS and does not include a new start for the budget year.

Summary

The most recent DOE O 413.3B approved Critical Decision (CD) is CD-2, Approve Project Performance Baseline, which was approved on June 22, 2016, with a Total Project Cost of $16,100K and a CD-4 of 1Q FY 2020.

A Federal Project Director has been assigned to this project and has approved this CPDS.

This project constructs a building to temporarily store overpacks loaded with naval spent nuclear fuel canisters until a national spent nuclear fuel management plan is approved. FY 2018 funds requested for this project will be used for construction efforts.

Critical Milestone History
(Fiscal Quarter or Date)

	CD-0	Conceptual Design Complete	CD-1	CD-2	Final Design Complete	CD-3	D&D Complete	CD-4
FY 2015	4/23/2012		2Q FY 2015	2Q FY 2016	1Q FY 2017	2Q FY 2017	N/A	3Q FY 2019
FY 2016	4/23/2012	1Q FY 2015	2Q FY 2015	2Q FY 2016	1Q FY 2017	2Q FY 2017	N/A	3Q FY 2019
FY 2017	4/23/2012	3/31/2015	3/31/2015	3Q FY 2016	3Q FY 2017	3Q FY 2017	N/A	1Q FY 2020[a]
FY 2018 PB	4/23/2012	3/31/2015	3/31/2015	6/22/2016	3Q FY 2017	3Q FY 2017	N/A	1Q FY 2020

CD-0 – Approve Mission Need for a construction project with a conceptual scope and cost range
Conceptual Design Complete – Actual date the conceptual design was completed
CD-1 – Approve Design Scope and Project Cost and Schedule Ranges
CD-2 – Approve Project Performance Baseline
Final Design Complete – Estimated/Actual date the project design will be/was complete/d
CD-3 – Approve Start of Construction
D&D Complete – Completion of D&D work (see Section 9)
CD-4 – Approve Start of Operations or Project Closeout
PB – Indicates the Performance Baseline

Project Cost History
(Dollars in Thousands)

	TEC, Design	TEC, Construction	TEC, Total	OPC Except D&D	OPC, D&D	OPC, Total	TPC
FY 2015	1,300	14,400	15,700	400	N/A	400	16,100
FY 2016	1,300	14,400	15,700	400	N/A	400	16,100
FY 2017	1,300	14,400	15,700	400	N/A	400	16,100

[a] CD milestones changed to better integrate with other planned construction projects at NRF.

(Dollars in Thousands)

	TEC, Design	TEC, Construction	TEC, Total	OPC Except D&D	OPC, D&D	OPC, Total	TPC
FY 2018 PB	1,300	14,400	15,700	400	N/A	400	16,100

Project Scope and Justification

Scope

This project designs and constructs a building to temporarily store overpacks loaded with naval spent nuclear fuel canisters until a national spent nuclear fuel management plan is implemented. This will be an approximately 23,000 square feet, single-story building which is currently planned to accommodate 70-80 overpack containers, extending overpack storage capacity through 2032. The building must have a reinforced, air-pallet quality slab and thermal control for dry storage of spent nuclear fuel. The project will install the appropriate utilities at the building site and install roadways around the building for fire protection access.

Justification

Specially-designed concrete overpack containers are used to store packaged naval spent nuclear fuel until a national spent nuclear fuel management plan is implemented. Overpack Storage Expansion 3 is needed to ensure availability of additional overpack storage capacity by 2020. Absent this expanded storage capacity for new overpacks, the Program risks delaying placement of spent nuclear fuel into dry storage, potentially idling a primary mission of the Naval Reactors Facility and affecting commitments to the State of Idaho.

Maximum capacity to store loaded overpacks is reached in 2022, however it is impractical to use the maximum capacity for loaded overpacks for three existing overpack storage buildings simultaneously because space is needed to move overpacks around and empty overpack storage is needed to prevent interruption to dry storage operations. Therefore, the actual need for the Overpack Storage Expansion 3 is 2020.

Naval Reactors approved the location for the Overpack Storage Expansion 3 project in CD-1, Alternative Selection and Cost Range. NRF is the sole location in the Naval Reactors Program which has the facilities, equipment, and established processes for processing naval spent nuclear fuel for transportation to a national spent nuclear fuel repository.

The project has an equivalency to the project management requirements in DOE O 413.3B, Program and Project Management for the Acquisition of Capital Assets. The project is being conducted in accordance with the Naval Reactors (NR) Implementation Bulletin for DOE O 413.3B, and appropriate project management requirements have been met.

Financial Schedule

	(Dollars in Thousands)			
	Appropriations	**Plan**	**Obligations**	**Costs**[a]
Total Estimated Cost (TEC)				
Design				
FY 2015	N/A	N/A	N/A	132
FY 2016	N/A	N/A	N/A	235
FY 2017	N/A	N/A	N/A	702
FY 2018	N/A	N/A	N/A	88
FY 2019	N/A	N/A	N/A	97
FY 2020	N/A	N/A	N/A	46
Total, Design	**N/A**	**N/A**	**N/A**	**1,300**
Construction				
FY 2017	N/A	N/A	N/A	8
FY 2018	N/A	N/A	N/A	5,161
FY 2019	N/A	N/A	N/A	6,879
FY 2020	N/A	N/A	N/A	2,352
Total, Construction	**N/A**	**N/A**	**N/A**	**14,400**
TEC				
FY 2015	400	400	400	132
FY 2016	900	900	900	235
FY 2017	700	700	700	710
FY 2018	13,700	13,700	13,700	5,249
FY 2019	0	0	0	6,976
FY 2020	0	0	0	2,398
Total, TEC	**15,700**	**15,700**	**15,700**	**15,700**
Other Project Cost (OPC)				
OPC except D&D				
FY 2014	N/A	N/A	N/A	200
FY 2015	N/A	N/A	N/A	50
FY 2016	N/A	N/A	N/A	0
FY 2017	N/A	N/A	N/A	0
FY 2018	N/A	N/A	N/A	0
FY 2019	N/A	N/A	N/A	113
FY 2020	N/A	N/A	N/A	37
Total, OPC except D&D	**N/A**	**N/A**	**N/A**	**400**
D&D	N/A	N/A	N/A	N/A
Total, D&D	**N/A**	**N/A**	**N/A**	**N/A**

(Dollars in Thousands)

[a] Costs are updated to reflect the current spending plan.

	Appropriations	Plan	Obligations	Costs
OPC				
FY 2014	200	200	200	200
FY 2015	50	50	50	50
FY 2016	0	0	0	0
FY 2017	0	0	0	0
FY 2018	0	0	0	0
FY 2019	150	150	150	113
FY 2020	0	0	0	37
Total, OPC	**400**	**400**	**400**	**400**
Total Project Cost (TPC)				
FY 2014	200	200	200	200
FY 2015	450	450	450	182
FY 2016	900	900	900	235
FY 2017	700	700	700	710
FY 2018	13,700	13,700	13,700	5,249
FY 2019	150	150	150	7,089
FY 2020	0	0	0	2,435
Total, TPC	**16,100**	**16,100**	**16,100**	**16,100**

Details of Project Cost Estimate

(Dollars in Thousands)

	Current Total Estimate[a]	Previous Total Estimate[b]	Original Validated Baseline
Total Estimated Cost (TEC)			
Design			
Design	1,020	1,300	1,020
Contingency	280	0	280
Total, Design	**1,300**	**1,300**	**1,300**
Construction			
Equipment	0	700	0
Construction	12,019	8,600	12,019
Contingency	2,381	5,100	2,381
Total, Construction	**14,400**	**14,400**	**14,400**
Total, TEC	**15,700**	**15,700**	**15,700**
Contingency, TEC	2,661	5,100	2,661
Other Project Cost (OPC)			
OPC except D&D			
Conceptual Design	250	250	250
Start-up	150	150	150
Total, OPC except D&D	**400**	**400**	**400**
D&D			
D&D	N/A	N/A	N/A
Total, D&D	**N/A**	**N/A**	**N/A**
Total, OPC	**400**	**400**	**400**
Contingency, OPC	0	0	0
Total, TPC	**16,100**	**16,100**	**16,100**
Total, Contingency	**2,661**	**5,100**	**2,661**

[a] Estimate updated within Total Project Cost based on progression of Project plans and completion of CD-2.
[b] Previous Total Estimate is from the FY 2017 CPDS.

Schedule of Appropriation Requests

(Dollars in Thousands)

Request		Prior Years	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	Outyears	Total
FY 2015	TEC	1,300	700	13,700	0	0	0	0	0	**15,700**
	OPC	250	0	50	100	0	0	0	0	**400**
	TPC	1,550	700	13,750	100	0	0	0	0	**16,100**
FY 2016	TEC	1,300	700	13,700	0	0	0	0	0	**15,700**
	OPC	250	0	0	150	0	0	0	0	**400**
	TPC	1,550	700	13,700	150	0	0	0	0	**16,100**
FY 2017	TEC	1,300	700	13,700	0	0	0	0	0	**15,700**
	OPC	250	0	0	150	0	0	0	0	**400**
	TPC	1,550	700	13,700	150	0	0	0	0	**16,100**
FY 2018 PB	TEC	1,300	700	13,700	0	0	0	0	0	**15,700**
	OPC	250	0	0	150	0	0	0	0	**400**
	TPC	1,550	700	13,700	150	0	0	0	0	**16,100**

Related Operations and Maintenance Funding Requirements

Start of Operation or Beneficial Occupancy (fiscal quarter or date)	1Q FY 2020
Expected Useful Life (number of years)	40
Expected Future Start of D&D of this capital asset (fiscal quarter)	1Q FY 2060

(Related Funding requirements)

(Dollars in Thousands)

	Annual Costs		Life Cycle Costs	
	Current Total Estimate	**Previous Total Estimate**	**Current Total Estimate**	**Previous Total Estimate**
Operations	40	40	2,883	2,883
Utilities	4	4	288	288
Maintenance & Repair	8	8	576	576
Total	**52**	**52**	**3,747**	**3,747**

Required D&D Information

The new area being constructed in this project is not replacing existing facilities.

	Square Feet
New area being constructed by this project at the Naval Reactors Facility	23,000
Area of D&D in this project at the Naval Reactors Facility	0
Area at the Naval Reactors Facility to be transferred, sold, and/or D&D outside the project including area previously "banked"	0
Area of D&D in this project at other sites	0
Area at other sites to be transferred, sold, and/or D&D outside the project including area previously "banked"	0
Total area eliminated	0

The project has no planned offsetting D&D. The NRF site will expand to meet mission-critical work in support of fuel processing because there are insufficient excess facilities to meet the mission need of this project.

Acquisition Approach

The overpack storage expansion will be acquired using a design-bid-build approach. The design will be performed by an Architectural Engineer. Construction will be a fixed price contract. The approach was finalized as part of CD-2, Approve Project Performance Baseline.

15-D-903, KL Fire System Upgrade,
Knolls Atomic Power Laboratory, Schenectady, NY
Project is for Design and Construction

Significant Changes and Summary

Significant Changes

This Construction Project Data Sheet (CPDS) is unclassified and is an update of the FY 2016 CPDS and does not include a new start for the budget year.

Summary

The most recent DOE Order (O) 413.3B approved Critical Decision (CD) is CD-2, Approve Project Performance Baseline, which was approved on June 2, 2016, with a Total Project Cost of $17,495K and a CD-4 of 4Q FY 2020.

A Federal Project Director has been assigned to this project and has approved this CPDS. This project designs and installs site-wide and building systems upgrades to the Knolls Atomic Power Laboratory fire protection system to be consistent with national fire protection requirements and New York State Building Code. FY 2015 and FY 2016 project engineering and design funds supported detailed design efforts. In FY 2018, funds for this project will be used for construction efforts.

Critical Milestone History

(fiscal quarter or date)

	CD-0	Conceptual Design Complete	CD-1	CD-2	Final Design Complete	CD-3	D&D Complete	CD-4
FY 2015	10/25/2012		4Q FY 2014	3Q FY 2016	3Q FY 2017	4Q FY 2017	N/A	1Q FY 2020
FY 2016	10/25/2012	4Q FY 2014	4Q FY 2014	3Q FY 2016	3Q FY 2017	4Q FY 2017	N/A	1Q FY 2020
FY 2018 PB	10/25/2012	9/16/2014	9/16/2014	6/2/2016	3Q FY 2017	4Q FY 2017	N/A	4Q FY 2020

CD-0 – Approve Mission Need for a construction project with a conceptual scope and cost range
Conceptual Design Complete – Actual date the conceptual design was completed
CD-1 – Approve Design Scope and Project Cost and Schedule Ranges
CD-2 – Approve Project Performance Baseline
Final Design Complete – Estimated/Actual date the project design will be/was complete/d
CD-3 – Approve Start of Construction
D&D Complete –Completion of D&D work (see Section 9)
CD-4 – Approve Start of Operations or Project Closeout
PB – Indicates the Performance Baseline

Project Cost History[a]

(Dollars in Thousands)

	TEC, Design	TEC, Construction	TEC, Total	OPC, Except D&D	OPC, D&D	OPC, Total	TPC
FY 2015	1,200	15,000	16,200	1,200	N/A	1,200	17,400
FY 2016	1,200	15,000	16,200	1,200	N/A	1,200	17,400
FY 2018 PB	1,200	15,000	16,200	1,295	N/A	1,295	17,495

Project Scope and Justification

Scope

[a] Figures are only estimates and are consistent with the high end of the cost ranges.

This project will install a new fire alarm system, install new fire alarm control panels, install manual alarms throughout the site, install updated devices, incorporate capabilities for emergency control functions, and install Architectural Barriers Act-compliant audible and visual fire alarm occupant notification throughout the site. In addition, obsolete equipment will be removed to the extent practical.

Justification

This project will allow for the correction of performance gaps in the existing Knolls Laboratory site-wide fire alarm system, which is currently unable to distinguish between alarm, supervisory, and trouble signals. The site-wide and building systems need to be upgraded or replaced due to obsolescence and to be consistent with current national fire protection requirements and New York State Building Code.

This project will accomplish the following: replacement and upgrade of the current Knolls site-wide fire alarm system and building fire alarm control units for the purposes of re-capitalization to address widespread fire alarm system obsolescence. A significant portion of the site and building fire alarm equipment was installed in 1948 and does not meet current New York State Building Code. The project will address remaining deficiencies associated with the current site-wide fire alarm system's inability to monitor and transmit all building fire alarm signals (fire, supervisory, and trouble signals).

The project has an equivalency to the project management requirements in DOE O 413.3B, Program and Project Management for the Acquisition of Capital Assets. The project is being conducted in accordance with the Naval Reactors (NR) Implementation Bulletin for DOE O 413.3B, and all appropriate project management requirements have been met.

Financial Schedule

(Dollars in Thousands)

	Appropriations	Plan	Obligations	Costs[a]
Total Estimated Cost (TEC)				
Design				
FY 2015	N/A	N/A	N/A	215
FY 2016	N/A	N/A	N/A	536
FY 2017	N/A	N/A	N/A	449
Total, Design	**N/A**	**N/A**	**N/A**	**1,200**
Construction				
FY 2018	N/A	N/A	N/A	4,144
FY 2019	N/A	N/A	N/A	6,567
FY 2020	N/A	N/A	N/A	4,289
Total, Construction	**N/A**	**N/A**	**N/A**	**15,000**
TEC				
FY 2015	600	600	600	215
FY 2016	600	600	600	536
FY 2017	0	0	0	449
FY 2018	15,000	15,000	15,000	4,144
FY 2019	0	0	0	6,567
FY 2020	0	0	0	4,289
Total, TEC	**16,200**	**16,200**	**16,200**	**16,200**
Other Project Cost (OPC)				
OPC except D&D				
FY 2013	N/A	N/A	N/A	150
FY 2014	N/A	N/A	N/A	450
FY 2015	N/A	N/A	N/A	0
FY 2016	N/A	N/A	N/A	0
FY 2017	N/A	N/A	N/A	0
FY 2018	N/A	N/A	N/A	200
FY 2019	N/A	N/A	N/A	400
FY 2020	N/A	N/A	N/A	95
Total, OPC except D&D	**N/A**	**N/A**	**N/A**	**1,295**
D&D				
FY 2018	N/A	N/A	N/A	N/A
FY 2020	N/A	N/A	N/A	N/A
Total, D&D	**N/A**	**N/A**	**N/A**	**N/A**

[a] Costs are updated to reflect the current spending plan.

	(Dollars in Thousands)			
	Appropriations	**Plan**	**Obligations**	**Costs**
Other Project Cost (OPC)				
FY 2013	150	150	150	150
FY 2014	450	450	450	450
FY 2015	0	0	0	0
FY 2016	0	0	0	0
FY 2017	0	0	0	0
FY 2018	695	695	695	200
FY 2019	0	0	0	400
FY 2020	0	0	0	95
Total, OPC	**1,295**	**1,295**	**1,295**	**1,295**
Total Project Cost (TPC)				
FY 2013	150	150	150	150
FY 2014	450	450	450	450
FY 2015	600	600	600	215
FY 2016	600	600	600	536
FY 2017	0	0	0	449
FY 2018	15,695	15,695	15,695	4,344
FY 2019	0	0	0	6,967
FY 2020	0	0	0	4,384
Total, TPC	**17,495**	**17,495**	**17,495**	**17,495**

Details of Project Cost Estimate

	(Dollars in Thousands)		
	Current Total Estimate	**Previous Total Estimate**[a]	**Original Validated Baseline**
Total Estimated Cost (TEC)			
Design			
Design	1,200	1,100	1,200
Contingency	0	100	0
Total, Design	**1,200**	**1,200**	**1,200**
Construction			
Construction	13,722	12,300	13,722
Contingency	1,278	2,700	1,278
Total, Construction	**15,000**	**15,000**	**15,000**
Total, TEC	16,200	16,200	16,200
Contingency, TEC	**1,278**	**2,800**	**1,278**
Other Project Cost (OPC)			
OPC except D&D			
Conceptual Design	600	600	600
Startup	695	600	695
Total, OPC except D&D	**1,295**	**1,200**	**1,295**
D&D			
D&D	N/A	N/A	N/A
Total, D&D	**N/A**	**N/A**	**N/A**
Total, OPC	**1,295**	**1,200**	**1,295**
Contingency, OPC	0	0	0
Total, TPC	**17,495**	**17,400**	**17,495**
Total, Contingency	**1,278**	**2,800**	**1,278**

[a] Previous Total Estimate is from FY 2016 CPDS.

Schedule of Appropriation Requests

(Dollars in Thousands)

		Prior Years	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	Outyears	Total
FY 2015	TEC	1,200	0	15,000	0	0	0	0	0	**16,200**
	OPC	600	0	600	0	0	0	0	0	**1,200**
	TPC	1,800	0	15,600	0	0	0	0	0	**17,400**
FY 2016	TEC	1,200	0	15,000	0	0	0	0	0	**16,200**
	OPC	600	0	600	0	0	0	0	0	**1,200**
	TPC	1,800	0	15,600	0	0	0	0	0	**17,400**
FY 2017	TEC	1,200	0	15,000	0	0	0	0	0	**16,200**
	OPC	600	0	600	0	0	0	0	0	**1,200**
	TPC	1,800	0	15,600	0	0	0	0	0	**17,400**
FY 2018	TEC	1,200	0	15,000	0	0	0	0	0	**16,200**
	OPC	600	0	695	0	0	0	0	0	**1,295**
	TPC	1,800	0	15,695	0	0	0	0	0	**17,495**

Related Operations and Maintenance Funding Requirements

Start of Operation or Beneficial Occupancy (fiscal quarter or date)	1Q FY 2020
Expected Useful Life (number of years)	40
Expected Future Start of D&D of this capital asset (fiscal quarter)	1Q FY 2060

(Related Funding Requirements)

(Dollars in Thousands)

	Annual Costs		Life Cycle Costs	
	Current Total Estimate	Previous Total Estimate	Current Total Estimate	Previous Total Estimate
Operations	45	150	1,500	6,000
Utilities	15	N/A	521	N/A
Maintenance & Repair	45	100	1,500	4,000
Total	**105**	**250**	**3,521**	**10,000**

Required D&D Information

There is no new area being constructed in this construction project.

Acquisition Approach

The procurement strategy being executed for this project is Design-Bid-Build due to the uncertainty caused by the large number of interfaces with legacy systems and facilities. The construction contract will be placed using a fixed price contract.

14-D-901, Spent Fuel Handling Recapitalization Project
Naval Reactors Facility, Idaho
Project is for Design and Construction

Significant Changes and Summary

Significant Changes

This Construction Project Data Sheet (CPDS) is an update of the FY 2017 CPDS and does not include a new start for the budget year.

The Project completed Conceptual Design with Critical Decision – 1 (CD-1) on March 19, 2015. The Project revised the milestone date for Critical Decision – 2 to be consistent with the expectation for design maturity identified in the recent revision of DOE Order 413.3B; however, there are no changes to the Total Project Cost or construction schedule, as the Project continues to progress as planned.

Per the Consolidated and Further Continuing Appropriations Act, 2015, the Spent Fuel Handling Recapitalization Project Major Construction Project funding includes both Total Estimated Cost and Other Project Cost.

Summary

The most recent DOE Order (O) 413.3B approved Critical Decision is CD-1, Alternative Selection and Cost Range, that was approved on March 19, 2015 with a cost estimate of $1,646,500K (then-year) and a CD-4 of 3Q FY 2025.

A Federal Project Director has been assigned to this project and has approved this CPDS.

Consistent with the National Environmental Policy Act Record of Decision, published on December 5, 2016, the Spent Fuel Handling Recapitalization Project will design and construct a new facility with a footprint of approximately 213,000 square feet for handling naval spent nuclear fuel, including the capability to receive, unload, prepare, and package naval spent nuclear fuel. The Project is currently in the preliminary design phase, which includes refinement of safety assessments, requirements, and project management processes. The Project began preliminary design work in FY 2015.

Spent fuel handling operations in the existing Expended Core Facility will overlap with operations in the Spent Fuel Handling Recapitalization Project facility for a period of 5 to 12 years and examination operations in the existing Expended Core Facility will continue for the foreseeable future; therefore, the costs associated with D&D of the Expended Core Facility are not included in the range of costs cited for the Spent Fuel Handling Recapitalization Project.

Critical Milestone History[a]

(Fiscal Quarter or Date)

	CD-0	Conceptual Design Complete	CD-1	CD-2	Final Design Complete	CD-3	D&D Complete[b]	CD-4
FY 2014	03/29/2008		1Q FY 2014	3Q FY 2015	4Q FY 2016	4Q FY 2016	N/A	4Q FY 2022
FY 2015	03/29/2008		1Q FY 2014	3Q FY 2015	4Q FY 2016	4Q FY 2016	N/A	4Q FY 2022
FY 2015 Rev[c]	03/29/2008		1Q FY 2015	3Q FY 2017	4Q FY 2018	1Q FY 2018	N/A	4Q FY 2024
FY 2016[d]	03/29/2008		2Q FY 2015	1Q FY 2018	4Q FY 2019	4Q FY 2018	N/A	3Q FY 2025
FY 2017	03/29/2008	03/19/2015	03/19/2015	1Q FY 2018	3Q FY 2020[e]	4Q FY 2018	N/A	3Q FY 2025
FY 2018	03/29/2008	03/19/2015	03/19/2015	4Q FY 2018[f]	3Q FY 2020[e]	4Q FY 2018	N/A	3Q FY 2025

CD-0 – Approve Mission Need
Conceptual Design Complete – Actual date the conceptual design was completed
CD-1 – Approve Alternate Selection and Cost Range
CD-2 – Approve Performance Baseline
Final Design Complete – Estimated date the Project design will be completed
CD-3 – Approve Start of Construction/Execution
D&D Complete – Completion of D&D work (see Section 9)
CD-4 – Approve Start of Operations or Project Completion

(Fiscal Quarter or Date)

	CD-3A	CD-3B	CD-4A
FY 2017	2Q FY 2017	1Q FY2018	3Q FY 2024
FY 2018	12/7/2016	4Q FY 2017	3Q FY 2024

CD-3A – Start of Long Lead Material Procurement
CD-3B – Start of Early Site Preparation
CD-4A – Start of M-290 Shipping Container Unloading Operations

[a] Schedules are only estimates and consistent with the high end of the schedule ranges.
[b] D&D is not within the scope of this project
[c] The FY 2015 Revision incorporated the expected impacts of the Consolidated Appropriations Act, 2014 funding reductions.
[d] The FY 2016 CPDS incorporated the impacts from the FY 2015 delayed appropriation.
[e] The Final Design Complete date is an estimate only and represents a phased design
[f] The CD-2 milestone date has been revised to be consistent with DOE Order 413.3B Change 2, which requires 90% of the design to be complete before establishing the Performance Baseline.

Project Cost History[a]

(Dollars in Thousands)

	TEC, Design	TEC, Construction	TEC, Total	OPC, Except D&D	OPC, D&D	OPC, Total	TPC
FY 2014	369,400	917,100	1,286,500	165,000	N/A	165,000	1,451,500
FY 2015	369,400	917,100	1,286,500	165,000	N/A	165,000	1,451,500
FY 2015 Rev[c]	263,000	1,144,900	1,407,000	178,200	N/A	178,200	1,586,100
FY 2016[d]	268,800	1,182,100	1,450,900	195,600	N/A	195,600	1,646,500
FY 2017[b]	239,800	1,232,600	1,472,400	174,100	N/A	174,100	1,646,500
FY 2018	239,800	1,232,600	1,472,400	174,100	N/A	174,100	1,646,500

No construction, excluding approved long lead procurement and early site preparation, will be performed until the project performance baseline has been validated and CD-2/3 has been approved.

[a] Schedules are only estimates and consistent with the high end of the schedule ranges.

[b] D&D is not within the scope of this project

[c] The FY 2015 Revision incorporated the expected impacts of the Consolidated Appropriations Act, 2014 funding reductions.

[d] The FY 2016 CPDS incorporated the impacts from the FY 2015 delayed appropriation.

Project Scope and Justification
Scope

The Spent Fuel Handling Recapitalization Project will design and construct a new facility to incorporate the capabilities for naval spent nuclear fuel handling that currently exist in the Expended Core Facility (ECF) and its support facilities. Additionally, a major portion of this new facility is required to support additional capability, which does not exist in the Expended Core Facility, to handle full- length aircraft carrier naval spent nuclear fuel received in new M-290 shipping containers. The Spent Fuel Handling Recapitalization Project facility footprint will be approximately 213,000 square feet. Of this, approximately 121,000 square feet is required for spent fuel shipping container and dry storage operations, which includes approximately 17,000 square feet for water pool spent fuel preparation and in-process storage. The remainder of the facility, approximately 92,000 square feet, is required for waste management, facility systems operations, staging, warehousing, and administrative office space. Additionally, the facility will include two major process lines, over 20 operating stations, over 40 facility systems, and approximately 30 major equipment systems. The Spent Fuel Handling Recapitalization Project is in the preliminary design phase; therefore, the facility design is subject to change until designs are complete.

The following represents the general scope of the Spent Fuel Handling Recapitalization Project:

- Design and construct a facility and facility systems for naval spent nuclear fuel handling, including the capability to receive, unload, prepare, and package naval spent nuclear fuel.
- Design and construct infrastructure needed to support naval spent nuclear fuel handling operations.
- Design and procure equipment to make the facility ready for use to receive, unload, prepare, and package naval spent nuclear fuel.
- Provide the additional capability to unload M-290 spent fuel shipping containers in addition to the capability to unload M-140 shipping containers, which is currently provided by the Expended Core Facility.
- Prepare testing, operating, and preventative maintenance procedures and drawings, as needed, for the naval spent nuclear fuel handling process systems, equipment, facilities, and facility systems.
- Develop training programs and conduct personnel training, where appropriate.
- Develop project management procedures and manage Project activities.
- Provide support services needed for the Project.
- Manage sub-contracts supporting the design and construction.
- Prepare an Environmental Impact Statement in accordance with National Environmental Policy Act (NEPA).

Justification

The mission of Naval Reactors is to provide the nation with militarily effective nuclear propulsion plants and to ensure their safe, reliable, long-lived, and affordable operation. Naval Reactors maintains total responsibility for all aspects of the U.S. Navy's nuclear propulsion systems, including research, design, construction, testing, operation, maintenance, and disposal. At the end of reactor service life, Naval Reactors transports naval spent nuclear fuel from its origin (e.g., naval spent nuclear fuel from servicing shipyards and naval training platforms) to the Naval Reactors Facility at the Idaho National Laboratory.

The Expended Core Facility, located at the Naval Reactors Facility in Idaho, is the only facility with the capabilities to receive naval spent nuclear fuel shipping containers and process naval spent nuclear fuel. Although the current Expended Core Facility (ECF) continues to be maintained and operated in a safe and environmentally responsible manner, the existing infrastructure is over 55 years old, does not meet current standards (requirements applicable at the time of construction of ECF, including standards for concrete, steel, etc.); and requires recapitalization. The Expended Core Facility is also incapable of receiving full-length aircraft carrier naval spent nuclear fuel, which is required to support upcoming aircraft carrier refuelings. The magnitude of required sustainment efforts and incremental infrastructure upgrades within the Expended Core Facility pose substantial risk to the continued preparation of naval spent nuclear fuel for long term storage. Specifically, sustainment efforts could require delays to naval spent nuclear fuel shipping container unloading operations, which would interrupt refueling and defueling schedules for nuclear-powered vessels and would adversely affect the operational availability of the nuclear fleet. If this interruption were to extend over long periods of time, the ability to sustain fleet operations would be impacted, resulting ultimately in a significant decrement to the Navy's responsiveness and agility to fulfill military missions worldwide.

The existing Expended Core Facility at the Naval Reactors Facility in Idaho is a single facility that is approximately 197,000 square feet. However, other facilities at the Naval Reactors Facility support operations within the Expended Core Facility and include additional areas for administrative support and warehouse storage. The Expended Core Facility has two major capabilities: (1) to receive, unload, prepare, and package naval spent nuclear fuel and, (2) to conduct naval spent nuclear fuel examinations.

Actions necessary to continue Naval Reactors' ability to support naval spent nuclear fuel handling are the subject of an Environmental Impact Statement. The Final Environmental Impact Statement for recapitalization of the infrastructure supporting naval spent nuclear fuel was published on September 30, 2016 and includes an assessment of the environmental impacts associated with handling of naval spent nuclear fuel for the following alternatives:

(1) No Action Alternative – Maintain the naval spent nuclear fuel handling capabilities of the existing Expended Core Facility by continuing to use the existing infrastructure while performing corrective maintenance and repairs.
(2) Overhaul Alternative – Recapitalize the naval spent nuclear fuel handling capabilities of the Expended Core Facility by overhauling the existing facility with major refurbishment projects for the infrastructure and water pools.
(3) New Facility Alternative, including the Spent Fuel Handling Recapitalization Project – Recapitalize the naval spent nuclear fuel handling capabilities of the Expended Core Facility by constructing and operating a new facility at one of two potential locations at Naval Reactors Facility in Idaho.

The National Environmental Policy Act Record of Decision, which identified the New Facility Alternative as the preferred method to recapitalize the naval spent nuclear fuel handling capabilities of the Expended Core Facility, was published on December 5, 2016.

The Spent Fuel Handling Recapitalization Project has an equivalency to the project management requirements in DOE Order 413.3B, Program and Project Management for the Acquisition of Capital Assets. The Project is being conducted in accordance with the Naval Reactors Implementation Bulletin for DOE O 413.3B, and appropriate project management requirements have been met.

Prior to CD-2/3 approval, an independent cost estimate will be performed by the Department of Defense Office of Cost Assessment and Program Evaluation or another capable independent organization external to DOE.

Financial Schedule[a]

	(Dollars in Thousands)			
	Appropriations	**Plan**	**Obligations**	**Costs**[bc]
Total Estimated Cost (TEC)				
Design				
FY 2015	N/A	N/A	N/A	19,542[d]
FY 2016	N/A	N/A	N/A	56,846
FY 2017	N/A	N/A	N/A	78,433
FY 2018	N/A	N/A	N/A	84,979
Total, Design	**N/A**	**N/A**	**N/A**	**239,800**
Construction				
FY 2017[e]	N/A	N/A	N/A	5,500
FY 2018[e]	N/A	N/A	N/A	52,964
FY 2019	N/A	N/A	N/A	303,867
FY 2020	N/A	N/A	N/A	269,136
FY 2021	N/A	N/A	N/A	266,039
FY 2022	N/A	N/A	N/A	219,891
FY 2023	N/A	N/A	N/A	58,842
FY 2024	N/A	N/A	N/A	31,439
FY 2025	N/A	N/A	N/A	24,922
Total, Construction	**N/A**	**N/A**	**N/A**	**1,232,600**
TEC				
FY 2015	63,400	63,400	63,400	19,542
FY 2016	82,100	82,100	82,100	56,846
FY 2017[e]	96,900	96,900	96,900	83,933
FY 2018[e]	113,000	113,000	113,000	137,943
FY 2019	284,100	284,100	284,100	303,867
FY 2020	315,300	315,300	315,300	269,136
FY 2021	234,700	234,700	234,700	266,039
FY 2022	186,700	186,700	186,700	219,891
FY 2023	43,300	43,300	43,300	58,842
FY 2024	29,300	29,300	29,300	31,439
FY 2025	23,600	23,600	23,600	24,922
Total, TEC	**1,472,400**	**1,472,400**	**1,472,400**	**1,472,400**
Other Project Cost (OPC)				
OPC except D&D				
FY 2010	N/A	N/A	N/A	6,553
FY 2011	N/A	N/A	N/A	36,144
FY 2012	N/A	N/A	N/A	25,209

[a] Figures are only estimates and consistent with the high end of the cost ranges. Estimate updated within Total Project Cost based on progression of Project plans.
[b] FY16-25 costs are updated to reflect the current spending plan.
[c] FY10-15 costs are updated to remove rounding.
[d] Corrected to reflect actual split between TEC and OPC.
[e] Includes long lead material and site preparation.

	(Dollars in Thousands)			
	Appropriations	**Plan**	**Obligations**	**Costs**
FY 2013	N/A	N/A	N/A	28,983
FY 2014	N/A	N/A	N/A	25,403
FY 2015	N/A	N/A	N/A	8,514[a]
FY 2016	N/A	N/A	N/A	1,567
FY 2017	N/A	N/A	N/A	3,396
FY 2018	N/A	N/A	N/A	3,130
FY 2019	N/A	N/A	N/A	2,117
FY 2020	N/A	N/A	N/A	3,049
FY 2021	N/A	N/A	N/A	3,199
FY 2022	N/A	N/A	N/A	8,917
FY 2023	N/A	N/A	N/A	6,919
FY 2024	N/A	N/A	N/A	3,391
FY 2025	N/A	N/A	N/A	3,590
FY 2026	N/A	N/A	N/A	4,019
Total, OPC except D&D	**N/A**	**N/A**	**N/A**	**174,100**
D&D	N/A	N/A	N/A	N/A
Total, D&D	**N/A**	**N/A**	**N/A**	**N/A**
OPC				
FY 2010	6,600	6,600	6,600	6,553
FY 2011	36,100	36,100	36,100	36,144
FY 2012	25,200	25,200	25,200	25,209
FY 2013	29,000	29,000	29,000	28,983
FY 2014	25,400	25,400	25,400	25,403
FY 2015	6,600	6,600	6,600	8,514
FY 2016	3,900	3,900	3,900	1,567
FY 2017	3,100	3,100	3,100	3,396
FY 2018	3,000	3,000	3,000	3,130
FY 2019	2,900	2,900	2,900	2,117
FY 2020	3,700	3,700	3,700	3,049
FY 2021	4,300	4,300	4,300	3,199
FY 2022	6,300	6,300	6,300	8,917
FY 2023	4,400	4,400	4,400	6,919
FY 2024	3,600	3,600	3,600	3,391
FY 2025	6,200	6,200	6,200	3,590
FY 2026	3,800	3,800	3,800	4,019
Total, OPC	**174,100**	**174,100**	**174,100**	**174,100**
Total Project Cost (TPC)				
FY 2010	6,600	6,600	6,600	6,553
FY 2011	36,100	36,100	36,100	36,144
FY 2012	25,200	25,200	25,200	25,209
FY 2013	29,000	29,000	29,000	28,983

[a] Corrected to reflect actual cost split between TEC and OPC.

	Appropriations	Plan	Obligations	Costs
FY 2014	25,400	25,400	25,400	25,403
FY 2015	70,000	70,000	70,000	28,056

(Dollars in Thousands)

	Appropriations	Plan	Obligations	Costs
FY 2016	86,000	86,000	86,000	58,413
FY 2017[a]	100,000	100,000	100,000	87,329
FY 2018[a]	116,000	116,000	116,000	141,073
FY 2019	287,000	287,000	287,000	305,983
FY 2020	319,000	319,000	319,000	272,186
FY 2021	239,000	239,000	239,000	269,238
FY 2022	193,000	193,000	193,000	228,808
FY 2023	47,700	47,700	47,700	65,761
FY 2024	32,900	32,900	32,900	34,830
FY 2025	29,800	29,800	29,800	28,512
FY 2026	3,800	3,800	3,800	4,019
Total, TPC	**1,646,500**	**1,646,500**	**1,646,500**	**1,646,500**

Details of Project Cost Estimate[b]

(Dollars in Thousands)

	Current Total Estimate[c]	Previous Total Estimate[d]	Original Validated Baseline
Total Estimated Cost (TEC)			
Design			
Design	225,793	217,290	N/A
Contingency	14,007	22,510	N/A
Total, Design	**239,800**	**239,800**	**N/A**
Construction			
Long Lead Material and Site Preparation	57,143	51,400	N/A
Spent Fuel Handling Equipment	295,029	318,730	N/A
Facility Construction	723,340	606,748	N/A
Contingency	157,088	255,722	N/A
Total, Construction	**1,232,600**	**1,232,600**	**N/A**
Total, TEC	1,472,400	1,472,400	N/A
Contingency, TEC	**171,095**	**278,232**	**N/A**

[a] Includes long lead material and site preparation.
[b] Figures are only estimates and consistent with the high end of the cost ranges.
[c] Estimate updated within Total Project Cost based on progression of Project plans. The contingency estimate was updated based on completion of CD-1 and risk and uncertainty analysis, which allows the project to calculate the amount of contingency required to achieve a specific confidence level rather than targeting a percentage of Total Project Cost.
[d] Previous Total Estimate is from the FY 2017 CPDS.

(Dollars in Thousands)

	Current Total Estimate[a]	Previous Total Estimate[b]	Original Validated Baseline
Other Project Cost (OPC)			
OPC except D&D			
Conceptual Planning	42,697	42,700	N/A
Conceptual Design	88,453	86,621	N/A
Start-up	15,006	19,780	N/A
Other (e.g., EIS, Project Reviews)	7,240	8,231	N/A
Contingency	20,704	16,768	N/A
Total, OPC except D&D	**174,100**	**174,100**	**N/A**
D&D	0	0	N/A
Total, D&D	**0**	**0**	**N/A**
Total, OPC	**174,100**	**174,100**	**N/A**
Contingency, OPC	20,704	16,768	N/A
Total, TPC	**1,646,500**	**1,646,500**	**N/A**
Total, Contingency	**191,799**	**295,000**	**N/A**

Schedule of Appropriation Requests

(Dollars in Thousands)

		Prior Years	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	Outyears	Total
FY 2014	TEC	369,400	308,200	226,700	134,900	132,300	64,300	50,700	0	**1,286,500**
	OPC	127,100	1,800	3,300	5,100	7,700	10,700	9,300	0	**165,000**
	TPC	496,500	310,000	230,000	140,000	140,000	75,000	60,000	0	**1,451,500**
FY 2015	TEC	369,400	308,200	226,700	134,900	132,300	64,300	50,700	0	**1,286,500**
	OPC	127,100	1,800	3,300	5,100	7,700	10,700	9,300	0	**165,000**
	TPC	496,500	310,000	230,000	140,000	140,000	75,000	60,000	0	**1,451,500**
FY 2015 Rev	TEC	198,500	64,500	268,100	293,500	265,600	197,900	66,900	52,900	**1,407,900**
	OPC	128,300	3,300	3,300	4,500	4,500	6,500	6,700	21,100	**178,200**
	TPC	326,800	67,800	271,400	298,000	270,100	204,400	73,600	74,000	**1,586,100**
FY 2016	TEC	139,600	96,300	98,600	283,300	313,700	234,300	186,100	99,000	**1,450,900**
	OPC	137,900	3,700	3,400	3,700	5,300	4,700	6,900	30,000	**195,600**
	TPC	227,500	100,000	102,000	287,000	319,000	239,000	193,000	129,000	**1,646,500**
FY 2017	TEC	145,500	96,900	99,000	284,100	315,300	234,700	186,700	110,200	**1,472,400**
	OPC	132,800	3,100	3,000	2,900	3,700	4,300	6,300	18,000	**174,100**
	TPC[c]	278,300	100,000	102,000	287,000	319,000	239,000	193,000	128,200	**1,646,500**
FY 2018	TEC	145,500	96,900	113,000	284,100	315,300	234,700	186,700	96,200	**1,472,400**
	OPC	132,800	3,100	3,000	2,900	3,700	4,300	6,300	18,000	**174,100**
	TPC[c]	278,300	100,000	116,000	287,000	319,000	239,000	193,000	114,200	**1,646,500**

[a] Estimate updated within Total Project Cost based on progression of Project plans. The contingency estimate was updated based on completion of CD-1 and risk and uncertainty analysis, which allows the project to calculate the amount of contingency required to achieve a specific confidence level rather than targeting a percentage of Total Project Cost.
[b] Previous Total Estimate is from the FY 2017 CPDS.
[c] Per the Consolidated and Further Continuing Appropriations Act, 2015, the Spent Fuel Handling Recapitalization Project Major Construction Project funding includes both Total Estimated Cost and Other Project Cost.

Related Operations and Maintenance Funding Requirements

Start of Operation of Beneficial Occupancy	4Q FY 2024
Expected Useful Life	40 years
Expected Future Start of D&D	4Q FY 2064

(Related Funding requirements)

	(Dollars in Thousands)			
	Annual Costs		Life Cycle Costs	
	Current Total Estimate	Previous Total Estimate	Current Total Estimate	Previous Total Estimate
Operations	156,960	156,960	6,278,490	6,278,490
Utilities	1,430	1,430	57,050	57,050
Maintenance & Repair	8,000	8,000	320,130	320,130
Total	**166,390**	**166,390**	**6,655,670**	**6,655,670**

D&D Information

The new area being constructed in this project is replacing existing facilities; however, the costs of D&D of the facilities that are being replaced are not included in the costs of this construction project.

	Square Feet
New area being constructed by this Project at the Naval Reactors Facility	213,000[a]
Area of D&D in this Project at the Naval Reactors Facility	0
Area at the Naval Reactors Facility to be transferred, sold, and/or D&D outside the project including area previously "banked"	0
Area of D&D in this Project at other sites	0
Area at other sites to be transferred, sold, and/or D&D outside the Project including area previously "banked"	0
Total area eliminated	0

Spent fuel handling operations in the existing Expended Core Facility will overlap with operations in the Spent Fuel Handling Recapitalization Project facility for a period of 5 to 12 years and examination operations in the existing Expended Core Facility will continue for the foreseeable future; therefore, no D&D is planned at this time. Separate National Environmental Policy Act action will be taken to address these future actions, if necessary.

[a] The facility area has decreased from the conceptual design and is subject to change based on preliminary design.

Acquisition Approach

The integrated Management & Operating (M&O) prime partners will plan and execute the Spent Fuel Handling Recapitalization Project in accordance with requirements. Naval spent nuclear fuel handling equipment will be procured through the procurement M&O partners. An Engineering, Procurement, and Construction Management (EPCM) firm was selected as the subcontracting strategy for design and construction management of the facility and facility systems. The EPCM contract is cost plus fixed fee. Long-lead materials will be purchased and site preparation work will be performed ahead of CD-2/3.

Department Of Energy

FY 2018 Congressional Budget

Funding By Appropriation By Site

($K)

Naval Reactors	FY 2016 Enacted	FY 2017 Annualized CR	FY 2018 Request
Bettis Atomic Power Laboratory			
Naval Reactors Program			
Naval Reactors Program	485,696	521,874	556,205
Total, Bettis Atomic Power Laboratory	**485,696**	**521,874**	**556,205**
Idaho National Laboratory			
Naval Reactors Program			
Naval Reactors Program	148,115	150,307	163,438
Total, Idaho National Laboratory	**148,115**	**150,307**	**163,438**
Knolls Atomic Power Laboratory			
Naval Reactors Program			
Naval Reactors Program	596,959	574,568	601,952
Total, Knolls Atomic Power Laboratory	**596,959**	**574,568**	**601,952**
Naval Research Laboratory			
Program Direction			
Program Direction	18,950	18,950	20,700
Total, Naval Research Laboratory	**18,950**	**18,950**	**20,700**
Washington Headquarters			
Naval Reactors Program			
Naval Reactors Program	102,222	83,709	109,956
Program Direction			
Program Direction	23,554	23,473	27,500
Total, Washington Headquarters	**125,776**	**107,182**	**137,456**
Total, Naval Reactors	**1,375,496**	**1,372,881**	**1,479,751**

GENERAL PROVISIONS – DEPARTMENT OF ENRGY

(INCLUDING TRANSFER OF FUNDS)

SEC. 301. (a) No appropriation, funds, or authority made available by this title for the Department of Energy shall be used to initiate or resume any program, project, or activity or to prepare or initiate Requests For Proposals or similar arrangements (including Requests for Quotations, Requests for Information, and Funding Opportunity Announcements) for a program, project, or activity if the program, project, or activity has not been funded by Congress.

(b) (1) Unless the Secretary of Energy notifies the Committees on Appropriations of both Houses of Congress at least 3 full business days in advance, none of the funds made available in this title may be used to—

(A) make a grant allocation or discretionary grant award totaling $1,000,000 or more;

(B) make a discretionary contract award or Other Transaction Agreement totaling $1,000,000 or more, including a contract covered by the Federal Acquisition Regulation;

(C) issue a letter of intent to make an allocation, award, or Agreement in excess of the limits in subparagraph (A) or (B); or

(D) announce publicly the intention to make an allocation, award, or Agreement in excess of the limits in subparagraph (A) or (B).

(2) The Secretary of Energy shall submit to the Committees on Appropriations of both Houses of Congress within 15 days of the conclusion of each quarter a report detailing each grant allocation or discretionary grant award totaling less than $1,000,000 provided during the previous quarter.

(3) The notification required by paragraph (1) and the report required by paragraph (2) shall include the recipient of the award, the amount of the award, the fiscal year for which the funds for the award were appropriated, the account and program, project, or activity from which the funds are being drawn, the title of the award, and a brief description of the activity for which the award is made.

(c) The Department of Energy may not, with respect to any program, project, or activity that uses budget authority made available in this title under the heading "Department of Energy—Energy Programs", enter into a multiyear contract, award a multiyear grant, or enter into a multiyear cooperative agreement unless—

(1) the contract, grant, or cooperative agreement is funded for the full period of performance as anticipated at the time of award; or

(2) the contract, grant, or cooperative agreement includes a clause conditioning the Federal Government's obligation on the availability of future year budget authority and the Secretary notifies the Committees on Appropriations of both Houses of Congress at least 3 days in advance.

(d) Except as provided in subsections (e), (f), and (g), the amounts made available by this title shall be expended as authorized by law for the programs, projects, and activities specified in the "Final Bill" column in the "Department of Energy" table included under the heading "Title III—Department of Energy" in the explanatory statement accompanying this Act.

(e) The amounts made available by this title may be reprogrammed for any program, project, or activity, and the Department shall notify the Committees on Appropriations of both Houses of Congress at least 30 days prior to the use of any proposed reprogramming that would cause any program, project, or activity funding level to increase or decrease by more than $5,000,000 or 10 percent, whichever is less, during the time period covered by this Act.

(f) None of the funds provided in this title shall be available for obligation or expenditure through a reprogramming of funds that—

(1) creates, initiates, or eliminates a program, project, or activity;

(2) increases funds or personnel for any program, project, or activity for which funds are denied or restricted by this Act; or

(3) reduces funds that are directed to be used for a specific program, project, or activity by this Act.

(g) (1) The Secretary of Energy may waive any requirement or restriction in this section that applies to the use of funds made available for the Department of Energy if compliance with such requirement or restriction would pose a substantial risk to human health, the environment, welfare, or national security.

(2) The Secretary of Energy shall notify the Committees on Appropriations of both Houses of Congress of any waiver under paragraph (1) as soon as practicable, but not later than 3 days after the date of the activity to which a requirement or restriction would otherwise have applied. Such notice shall include an explanation of the substantial risk under paragraph (1) that permitted such waiver.

SEC. 302. The unexpended balances of prior appropriations provided for activities in this Act may be available to the same appropriation accounts for such activities established pursuant to this title. Available balances may be merged with funds in the applicable established accounts and thereafter may be accounted for as one fund for the same time period as originally enacted.

SEC. 303. Funds appropriated by this or any other Act, or made available by the transfer of funds in this Act, for intelligence activities are deemed to be specifically authorized by the Congress for purposes of section 504 of the National Security Act of 1947 (50 U.S.C. 3094) during fiscal year 2018 until the enactment of the Intelligence Authorization Act for fiscal year 2018.

SEC. 304. None of the funds made available in this title shall be used for the construction of facilities classified as high-hazard nuclear facilities under 10 CFR Part 830 unless independent oversight is conducted by the Office of Enterprise Assessments to ensure the project is in compliance with nuclear safety requirements.

SEC. 305. None of the funds made available in this title may be used to approve critical decision–2 or critical decision–3 under Department of Energy Order 413.3B, or any successive departmental guidance, for construction projects where the total project cost exceeds $100,000,000, until a separate independent cost estimate has been developed for the project for that critical decision.

SEC. 306. Notwithstanding section 301(c) of this Act, none of the funds made available under the heading "Department of Energy—Energy Programs—Science" in this or any subsequent Energy and Water Development and Related Agencies appropriations Act for any fiscal year may be used for a multiyear contract, grant, cooperative agreement, or Other Transaction Agreement of $1,000,000 or less unless the contract, grant, cooperative agreement, or Other Transaction Agreement is funded for the full period of performance as anticipated at the time of award.

SEC. 307. (a) NEW REGIONAL RESERVES.—The Secretary of Energy may not establish any new regional petroleum product reserve unless funding for the proposed regional petroleum product reserve is explicitly requested in advance in an annual budget submission and approved by the Congress in an appropriations Act.

(b) The budget request or notification shall include—

(1) the justification for the new reserve;

(2) a cost estimate for the establishment, operation, and maintenance of the reserve, including funding sources;

(3) a detailed plan for operation of the reserve, including the conditions upon which the products may be released;

(4) the location of the reserve; and

(5) the estimate of the total inventory of the reserve.

SEC. 308. Uranium Lease and Take-Back Revolving Fund.—There is hereby established in the Treasury of the United States a fund to be known as the "Uranium Lease and Take-Back Revolving Fund" (the Fund), which shall be available without fiscal year limitation, for Department of Energy expenses, including the purchase, construction, and acquisition of plant and capital equipment and other expenses necessary in carrying out section 3173 of the National Defense Authorization Act for Fiscal Year 2013. For initial capitalization, there is appropriated $1,000,000 to the Fund. Notwithstanding 31 U.S.C. 3302, revenues received under section 3173 of such Act in this and subsequent fiscal years shall be credited to the Fund to be available for carrying out the purposes of the Fund without further appropriation. Funds collected in fiscal year 2018 shall be credited as offsetting collections to the Fund, so as to result in a final fiscal year 2018 appropriation from the general fund estimated at not more than $0.

SEC. 309. Treatment of Lobbying and Political Activity Costs as Allowable Costs under Department of Energy Contracts.

(a) Allowable Costs.—

(1) Section 4801(b) of the Atomic Energy Defense Act (50 U.S.C. 2781(b)) is amended—

(A) by striking "(1)" and all that follows through "the Secretary" and inserting "The Secretary"; and

(B) by striking paragraph (2).

(2) Section 305 of the Energy and Water Development Appropriation Act, 1988, as contained in section 101(d) of Public Law 100–202 (101 Stat. 1329–125), is repealed.

(b) Regulations Revised.—The Secretary of Energy shall revise existing regulations consistent with the repeal of 50 U.S.C. 2781(b)(2) and section 305 of Public Law 100–202 and shall issue regulations to implement 50 U.S.C. 2781(b), as amended by subsection (a), no later than 150 days after the date of the enactment of this Act. Such regulations shall be consistent with the Federal Acquisition Regulation 48 C.F.R. 31.205–22.

SEC. 310. Not to exceed 5 percent of any appropriation made available for Department of Energy activities funded in this Act may be transferred between such appropriations, but no such appropriation, except as otherwise provided, shall be increased or decreased by more than 5 percent by any such transfers, and notification of any such transfers shall be submitted promptly to the Committees on Appropriations of the House of Representatives and the Senate.

SEC. 311. Notwithstanding section 161 of the Energy Policy and Conservation Act (42 U.S.C. 6241), the Secretary of Energy shall draw down and sell one million barrels of refined petroleum product from the Strategic Petroleum Reserve during fiscal year 2018. Proceeds from sales under this section shall be deposited into the general fund of the Treasury during fiscal year 2018.

Title V – General Provisions

SEC. 501. None of the funds appropriated by this Act may be used in any way, directly or indirectly, to influence congressional action on any legislation or appropriation matters pending before Congress, other than to communicate to Members of Congress as described in 18 U.S.C. 1913.

SEC. 502. None of the funds made available by this Act may be used in contravention of Executive Order No. 12898 of February 11, 1994 (Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations).