DOE/CF-0119
Volume 1

Department of Energy
FY 2017 Congressional Budget Request

National Nuclear Security Administration

Weapons Activities
Defense Nuclear Nonproliferation
Naval Reactors
Federal Salaries and Expenses

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FUNDING BY APPROPRIATION

($K)

	FY 2015 Enacted	FY 2015 Current	FY 2016 Enacted	FY 2017 Request[1]	FY 2017 vs. FY 2016 $	FY 2017 vs. FY 2016 %
Department of Energy Budget by Appropriation						
Energy and Water Development, and Related Agencies						
Energy Programs						
Energy Efficiency and Renewable Energy	1,914,195	1,840,847	2,069,194	2,898,400	+829,206	+40.1%
Electricity Delivery and Energy Reliability	146,975	143,901	206,000	262,300	+56,300	+27.3%
Nuclear Energy	833,379	821,883	986,161	993,896	+7,735	+0.8%
Office of Technology Transitions	0	0	0	8,400	+8,400	N/A
21st Century Clean Transportation Plan Investments	0	0	0	1,335,000	+1,335,000	N/A
Fossil Energy Programs						
Clean Coal Technology	-6,600	-2,876	0	0	0	N/A
Fossil Energy Research and Development	560,587	548,885	632,000	600,000	-32,000	-5.1%
Use of Prior Year Balances	0	0	0	-240,000	0	N/A
Naval Petroleum and Oil Shale Reserves	19,950	20,640	17,500	14,950	-2,550	-14.6%
Elk Hills School Lands Fund	15,580	15,580	0	0	0	N/A
Strategic Petroleum Reserve	200,000	200,000	212,000	257,000	+45,000	+21.2%
Northeast Home Heating Oil Reserve	1,600	1,600	7,600	6,500	-1,100	-14.5%
Total, Fossil Energy Programs	**791,117**	**783,829**	**869,100**	**638,450**	**-230,650**	**-26.5%**
Uranium Enrichment Decontamination and Decommissioning (UED&D) Fund	625,000	625,000	673,749	673,749	0	N/A
Energy Information Administration	117,000	117,000	122,000	131,125	+9,125	+7.5%
Non-Defense Environmental Cleanup	246,000	246,030	255,000	218,400	-36,600	-14.4%
Science	5,067,738	5,132,813	5,347,000	5,672,069	+325,069	+6.1%
Advanced Research Projects Agency - Energy (ARPA-E)	279,982	279,982	291,000	500,000	+209,000	+71.8%
Departmental Administration	125,043	135,686	130,971	144,866	+13,895	+10.6%
Office of Indian Energy	0	0	0	22,930	+22,930	N/A
Office of the Inspector General	40,500	40,500	46,424	44,424	-2,000	-4.3%
Title 17 - Innovative Technology Loan Guarantee Program	17,000	17,000	17,000	10,000	-7,000	-41.2%
Advanced Technology Vehicles Manufacturing Loan Program	4,000	4,000	6,000	5,000	-1,000	-16.7%
Total, Energy Programs	**10,207,929**	**10,188,471**	**11,019,599**	**13,559,009**	**+2,539,410**	**+23.0%**
Atomic Energy Defense Activities						
National Nuclear Security Administration						
Weapons Activities	8,180,359	8,180,609	8,846,948	9,243,147	+396,199	+4.5%
Defense Nuclear Nonproliferation	1,615,248	1,612,651	1,940,302	1,807,916	-132,386	-6.8%
Naval Reactors	1,233,840	1,233,840	1,375,496	1,420,120	+44,624	+3.2%
Office of the Administrator	-413	-413	0	0	0	N/A
Federal Salaries and Expenses	370,000	370,000	363,766	412,817	+49,051	+13.5%
Total, National Nuclear Security Administration	**11,399,034**	**11,396,687**	**12,526,512**	**12,884,000**	**+357,488**	**+2.9%**
Environmental and Other Defense Activities						
Defense Environmental Cleanup	4,990,017	4,989,555	5,289,742	5,226,950	-62,792	-1.2%
Other Defense Activities	753,449	753,449	776,425	791,552	+15,127	+1.9%
Total, Environmental and Other Defense Activities	**5,743,466**	**5,743,004**	**6,066,167**	**6,018,502**	**-47,665**	**-0.8%**
Total, Atomic Energy Defense Activities	**17,142,500**	**17,139,691**	**18,592,679**	**18,902,502**	**+309,823**	**+1.7%**
Power Marketing Administrations						
Southeastern Power Administration	0	0	0	0	0	N/A
Southwestern Power Administration	11,400	11,400	11,400	11,057	-343	-3.0%
Western Area Power Administration	91,740	91,740	93,372	95,581	+2,209	+2.4%
Falcon and Amistad Operating and Maintenance Fund	228	228	228	232	+4	+1.8%
Colorado River Basins Power Marketing Fund	-23,000	-23,000	-23,000	-23,000	0	N/A
Total, Power Marketing Administrations	**80,368**	**80,368**	**82,000**	**83,870**	**+1,870**	**+2.3%**
Federal Energy Regulatory Commission (FERC)	0	0	0	0	0	N/A
Subtotal, Energy and Water Development and Related Agencies	**27,430,797**	**27,408,530**	**29,694,278**	**32,545,381**	**+2,851,103**	**+9.6%**
Uranium Enrichment Decontamination and Decommissioning Fund Discretionary Payments	-463,000	-463,000	0	-155,100	-155,100	N/A
Uranium Enrichment Decontamination and Decommissioning Fund Contribution	463,000	463,000	0	155,100	+155,100	N/A
Excess Fees and Recoveries, FERC	-28,485	-17,325	-23,587	-9,426	+14,161	+60.0%
Title XVII Loan Guarantee Program Section 1703 Negative Credit Subsidy Receipt	0	0	-68,000	-37,000	+31,000	+45.6%
Total, Funding by Appropriation	**27,402,312**	**27,391,205**	**29,602,691**	**32,498,955**	**+2,896,264**	**+9.8%**

[1] FY 2017 Request includes mandatory spending: $1.335B for Clean Transportation Plan, $674M for UED&D Fund, $150M for ARPA-E, and $100M for Science.

National Nuclear Security Administration
Overview

(Dollars in Thousands)

	FY 2015 Enacted	FY 2015 Current	FY 2016 Enacted	FY 2017 Request	FY 2017 vs. FY 2016 $	FY 2017 vs. FY 2016 %
National Nuclear Security Administration						
Federal Salaries and Expenses	369,587	369,587	363,766	412,817	+49,051	13.5%
Weapons Activities	8,180,359	8,180,609	8,846,948	9,243,147	+396,199	4.5%
Defense Nuclear Nonproliferation	1,615,248	1,612,651	1,940,302	1,807,916	-132,386	-6.8%
Naval Reactors	1,233,840	1,233,840	1,375,496	1,420,120	+44,624	3.2%
Total, National Nuclear Security Administation	**11,399,034**	**11,396,687**	**12,526,512**	**12,884,000**	**+357,488**	**+2.9%**
Support of DoD Requirements	0	0	0	0		
Total, NNSA OMB Scoring	**11,399,034**	**11,396,687**	**12,526,512**	**12,884,000**		

Overview

The FY 2017 Request is $12,884,000,000, an increase of $357,488,000 (2.9 percent) above the FY 2016 enacted level to sustain the U.S. nuclear stockpile and modernize the aging infrastructure as the United States enabling a continued reduction in the size of the stockpile; execute the international nuclear nonproliferation agenda, including efforts to prevent nuclear weapons-usable materials from falling into the wrong hands; and provide safe and effective integrated nuclear propulsion systems to the U.S. Navy. The Request also supports an efficient governance model and staffing for the nuclear security enterprise, with a focus on NNSA policies and plans, alignment of project management responsibilities and accountability, and appropriate leadership and management at all levels.

The FY 2017 budget for the National Nuclear Security Administration (NNSA) is a fiscally-responsible budget that supports the President's agenda 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 and to support the Navy. NNSA will continue to refine the necessary amounts of funding to address validated requirements based on detailed Analysis of Alternatives and Independent Cost Estimates.

NNSA Future-Years Nuclear Security Program[b]

(Dollars in Thousands)

	FY 2018 Request	FY 2019 Request	FY 2020 Request	FY 2021 Request
National Nuclear Security Administration				
Federal Salaries and Expenses	435,595	443,518	451,640	459,963
Weapons Activities	9,661,305	9,863,303	10,117,852	10,518,197
Defense Nuclear Nonproliferation	1,974,349	1,982,792	2,025,191	2,134,392
Naval Reactors	1,467,751	1,778,387	1,778,317	1,670,948
Total, National Nuclear Security Administation	**13,539,000**	**14,068,000**	**14,373,000**	**14,783,500**
Support of DoD Requirements	-1,664,913	-1,698,378	-1,735,000	-1,769,700
Total, NNSA OMB Scoring	**11,874,087**	**12,369,622**	**12,638,000**	**13,013,800**

Public Law Authorizations

- P.L. 106-65, National Nuclear Security Administration Act, as amended
- P.L. 114-92, National Defense Authorization Act for Fiscal Year 2016

[a] The Consolidated and Further Continuing Appropriations Act, 2015, includes one-time rescissions of prior year balances as follows: $413,000 for Federal Salaries and Expenses, $51,411,000 for Weapons Activities, $26,121,000 for Defense Nuclear Nonproliferation, and $4,660,000 for Naval Reactors.

[b] The annual totals include an allocation to NNSA from the Department of Defense's five year budget plan. The amounts included are $1,664,913,000 in FY 2018, $1,664,913,000 in FY 2019, $1,735,000,000 in FY 2020, and $1,769,700,000 in FY 2021.

Appropriation Summary by Program[a]
Funding

(Dollars in Thousands)

	FY 2015 Enacted	FY 2015 Current	FY 2016 Enacted	FY 2017 Request	FY 2017 vs FY 2016
Federal Salaries and Expenses					
Program Direction	370,000	370,000	383,666	412,817	+29,151
Prior Year Balance Rescission	-413	-413	-19,900	0	+19,900
Total, Federal Salaries and Expenses	**369,587**	**369,587**	**363,766**	**412,817**	**+49,051**
Weapons Activities Appropriation					
Directed Stockpile Work	2,692,588	2,709,731	3,387,792	3,330,527	-57,265
Science	412,091	412,091	423,059	441,984	+18,925
Engineering	136,005	136,005	131,377	139,487	+8,110
Inertial Confinement Fusion Ignition and High Yield	512,895	512,895	511,050	522,959	+11,909
Advanced Simulation and Computing	598,000	598,000	623,006	663,184	+40,178
Advanced Manufacturing Development	107,200	107,200	130,056	87,105	-42,951
Infrastructure and Operations (formerly RTBF)	2,033,400	2,033,562	2,279,124	2,721,952	+442,828
Secure Transportation Asset	219,000	219,924	237,118	282,732	+45,614
Nuclear Counterterrorism Incident Response	177,940	178,190	0	0	0
Counterterrorism and Counterproliferation Programs	46,093	46,093	0	0	0
Site Stewardship	76,531	76,531	0	0	0
Defense Nuclear Security	636,123	636,123	682,891	670,133	-12,758
Information Technology and Cybersecurity	179,646	179,646	157,588	176,592	+19,004
Legacy Contractor Pensions	307,058	307,058	283,887	248,492	-35,395
Domestic Uranium Enrichment (DUE) Research, Development and Demonstration	97,200	97,200	0	0	0
Subtotal, Weapons Activities	**8,231,770**	**8,250,249**	**8,846,948**	**9,285,147**	**+438,199**
Use of Prior Year Balances	0	-18,229	0	0	0
Prior Year Balance Rescission	-51,411	-51,411	0	-42,000	-42,000
Total, Weapons Activities Appropriation	**8,180,359**	**8,180,609**	**8,846,948**	**9,243,147**	**+396,199**
Defense Nuclear Nonproliferation Appropriation					
Defense Nuclear Nonproliferation Programs					
Material Management and Minimization	0	0	316,584	341,094	+24,510
Global Material Security	0	0	426,751	337,108	-89,643
Nonproliferation and Arms Control	0	0	130,203	124,703	-5,500
Defense Nuclear Nonproliferation R&D	393,401	386,308	419,333	393,922	-25,411
Nonproliferation Construction	0	0	340,000	270,000	-70,000
Global Threat Reduction Initiative	325,752	330,552	0	0	0
Nonproliferation and International Security	141,359	141,359	0	0	0
International Material Protection & Cooperation	270,911	270,607	0	0	0
Fissile Materials Disposition	430,000	440,000	0	0	0
Subtotal, Defense Nuclear Nonproliferation Programs	**1,561,423**	**1,568,826**	**1,632,871**	**1,466,827**	**-166,044**
Nuclear Counterterrorism and Incident Response Program	0	0	234,390	271,881	+37,491
Legacy Contractor Pensions	102,909	102,909	94,617	83,208	-11,409
Subtotal, Defense Nuclear Nonproliferation Appropriation	**1,664,332**	**1,671,735**	**1,961,878**	**1,821,916**	**-139,962**
Use of Prior Year Balances	-22,963	-32,963	-21,576	0	+21,576
Prior Year Balance Rescission	-26,121	-26,121	0	-14,000	0
Total, Defense Nuclear Nonproliferation Appropriation	**1,615,248**	**1,612,651**	**1,940,302**	**1,807,916**	**-118,386**
Naval Reactors					
Naval Reactors	1,238,500	1,238,500	1,375,496	1,420,120	+44,624
Prior Year Balance Rescission	-4,660	-4,660	0	0	0
Total, Naval Reactors	**1,233,840**	**1,233,840**	**1,375,496**	**1,420,120**	**+44,624**
Total, NNSA	**11,399,034**	**11,396,687**	**12,526,512**	**12,884,000**	**+357,488**
Support of DoD Requirements	0	0	0	0	0
Total, NNSA (OMB Scoring)	**11,399,034**	**11,396,687**	**12,526,512**	**12,884,000**	**+357,488**

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

Outyear Appropriation Summary by Program
Funding

(Dollars in Thousands)

	FY 2018 Request	FY 2019 Request	FY 2020 Request	FY 2021 Request
Federal Salaries and Expenses				
Program Direction	435,595	443,518	451,640	459,963
Prior Year Balance Rescission	0	0	0	0
Total, Federal Salaries and Expenses	**435,595**	**443,518**	**451,640**	**459,963**
Weapons Activities Appropriation				
Directed Stockpile Work	3,752,048	3,781,917	3,938,630	4,268,243
Science	489,659	514,727	526,457	506,119
Engineering	143,818	146,030	146,605	147,386
Inertial Confinement Fusion Ignition and High Yield	544,934	556,893	569,637	568,755
Advanced Simulation and Computing	668,244	685,471	707,673	720,305
Advanced Manufacturing Development	69,846	66,470	77,684	87,910
Infrastructure and Operations (formerly RTBF)	2,645,927	2,792,893	2,829,102	2,885,794
Secure Transportation Asset	330,064	355,109	340,982	331,839
Nuclear Counterterrorism Incident Response	0	0	0	0
Counterterrorism and Counterproliferation Programs	0	0	0	0
Site Stewardship	0	0	0	0
Defense Nuclear Security	680,977	692,081	704,944	721,942
Information Technology and Cybersecurity	178,728	184,308	188,734	192,500
Legacy Contractor Pensions	157,060	87,404	87,404	87,404
Domestic Uranium Enrichment (DUE) Research, Development and Demonstration	0	0	0	0
Subtotal, Weapons Activities	**9,661,305**	**9,863,303**	**10,117,852**	**10,518,197**
Use of Prior Year Balances	0	0	0	0
Prior Year Balance Rescission	0	0	0	0
Total, Weapons Activities Appropriation	**9,661,305**	**9,863,303**	**10,117,852**	**10,518,197**
Defense Nuclear Nonproliferation Appropriation				
Defense Nuclear Nonproliferation Programs				
Material Management and Minimization	424,195	419,200	436,007	447,261
Global Material Security	409,132	434,420	446,245	537,101
Nonproliferation and Arms Control	137,681	140,099	142,867	145,545
Defense Nuclear Nonproliferation R&D	476,677	486,517	492,123	496,367
Nonproliferation Construction	221,000	221,000	221,000	221,000
Global Threat Reduction Initiative	0	0	0	0
Nonproliferation and International Security	0	0	0	0
International Material Protection & Cooperation	0	0	0	0
Fissile Materials Disposition	0	0	0	0
Subtotal, Defense Nuclear Nonproliferation Programs	**1,668,685**	**1,701,236**	**1,738,242**	**1,847,274**
Nuclear Counterterrorism and Incident Response Program	253,024	252,260	257,653	257,822
Legacy Contractor Pensions	52,640	29,296	29,296	29,296
Subtotal, Defense Nuclear Nonproliferation Appropriation	**1,974,349**	**1,982,792**	**2,025,191**	**2,134,392**
Use of Prior Year Balances	0	0	0	0
Prior Year Balance Rescission	0	0	0	0
Total, Defense Nuclear Nonproliferation Appropriation	**1,974,349**	**1,982,792**	**2,025,191**	**2,134,392**
Naval Reactors				
Naval Reactors	1,467,751	1,778,387	1,778,317	1,670,948
Prior Year Balance Rescission	0	0	0	0
Total, Naval Reactors	**1,467,751**	**1,778,387**	**1,778,317**	**1,670,948**
Total, NNSA	**13,539,000**	**14,068,000**	**14,373,000**	**14,783,500**
Support of DoD Requirements	-1,664,913	-1,698,378	-1,735,000	-1,769,700
Total, NNSA (OMB Scoring)	**11,874,087**	**12,369,622**	**12,638,000**	**13,013,800**

Overview

The FY 2017 NNSA Request of $12,884,000,000 implements four major national security endeavors consistent with the Department of Energy's (DOE) Strategic Plan: (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) supports safe and effective integrated nuclear propulsion for the U.S. Navy.

The FY 2017 Budget Request also supports national security priorities articulated in the 2010 Nuclear Posture Review (NPR), the NNSA Enterprise Strategic Vision, the Stockpile Stewardship and Management Plan (SSMP), and Prevent, Counter, and Respond—A Strategic Plan to Reduce Global Nuclear Threats (NPCR). The priorities in these documents are reflected in the DOE Strategic Plan for 2014-2018 and guide decisions on allocation of resources in the President's Budget Request.

The FY 2017 Budget Request for **Weapons Activities (WA)** is $9,243,147,000, a $396,199,000 (4.5 percent) increase above the FY 2016 enacted level. Programs within the Weapons Activities appropriation are conducted primarily at eight sites by a workforce of approximately 30,000 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 capping NNSA 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 in order 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 for this change in pension strategy . This change is expected to save approximately $84,000,000 in FY 2017 and $277,000,000 over the Future Years Nuclear Security Plan (FYNSP) period.

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 arrests the growth in deferred maintenance at NNSA's aging facilities and infrastructure, supports the design and procurement of a new Mobile Guardian Transporter to replace the aging Safeguards Transporter, begins design work for a new facility for about 1,200 federal staff in Albuquerque who currently work in inadequate facilities built in the 1940s and 1950s, and accelerates dismantlement of retired warheads by 20 percent,. 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 2017 Budget Request for **Defense Nuclear Nonproliferation (DNN)** is $1,807,916,000, a $132,386,000 (6.8 percent) decrease below the FY 2016 Enacted Level. The DNN appropriation includes all NNSA funding to prevent, counter and respond to global nuclear dangers in one appropriation, and strengthens existing collaborations and shared missions between the Defense Nuclear Nonproliferation Program and the Nuclear Counterterrorism and Incident Response (NCTIR) Program. Nuclear threat reduction is one of the three pillars of the NNSA mission, as identified in the 2015 DOE/NNSA Enterprise Strategic Vision. The NNSA strategy addresses 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 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 the Department's approach to emergency management. The DNN programs require less new budget authority in FY 2017 compared to FY 2016 enacted level primarily due to the availability of prior year carryover balances and the termination of

the MOX project beginning in FY 2017, due to the adoption by the Department of the dilute and dispose option as the path forward on plutonium disposition.

The FY 2017 Budget Request for **Naval Reactors (NR)** is $1,420,120,000 a $44,624,000 (3.2 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 *Ohio*-Class Replacement 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 supports DOE's pursuit of its Strategic Plan Goal of Nuclear Security, and plays a critical role in meeting DOE's Strategic Objective 7, to provide safe and effective integrated nuclear propulsion systems for the U.S. Navy.

The FY 2017 Budget Request for **NNSA Federal Salaries and Expenses (FSE)** is $412,817,000, a $49,051,000 (13.5 percent) increase above the FY 2016 enacted level, which includes a prior year rescission of $19,900,000, for Federal staffing and support expenses needed to meet mission requirements. The FSE appropriation supports DOE's pursuit of its Strategic Plan goal of Nuclear Security, and contributes toward meeting DOE's Strategic Objective to attract, manage, train and retain a highly skilled Federal workforce to meet future mission needs. The Request provides funding for the salary, benefits, and support expenses of 1,715 federal full-time equivalents (FTEs) to provide federal oversight of the nuclear security enterprise responsible for managing and executing NNSA's mission. This level of funding supports an additional 60 FTEs from anticipated FY 2016 levels to support increases for appropriate oversight and management in Life Extension Programs (LEPs), major project management, and key support functional areas (25 FTEs above the 2016 authorized 1,690).

Highlights and Major Changes in the FY 2017 Budget

Weapons Activities

The major elements of the FY 2017 - 2021 Request include:

- 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 Alt 370 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 dismantlement with the goal of eliminating weapons retired prior to 2009 by 2021.
- 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 arrest growth in 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, thereby reducing operations, maintenance, and recapitalization requirements.
- Support the President's goal for exascale high performance computing to maintain the performance of the nuclear weapons computer codes needed to ensure the safety, security, and reliability of the nuclear stockpile.

Defense Nuclear Nonproliferation

The major elements of the FY 2017 - 2021 Request include:

- Support implementation of the Joint Comprehensive Plan of Action (JCPOA) to address Iran's nuclear program through safeguards and export control activities; and provide critical mission support to the IAEA, including strengthening the international nuclear safeguards system.
- Terminate the MOX fuel approach and adopt the dilute and dispose option for plutonium disposition.
- Continue high-priority nuclear and radiological threat reduction efforts and support for international nuclear security best practices exchanges;
- Support U.S. statutory, treaty, and international agreement obligations;
- Respond to urgent emerging nonproliferation threats in unstable regions, particularly the Middle East;
- Advance capabilities that support technical approaches for monitoring foreign nuclear weapons program activities, diversion of SNM, and global nuclear detonations.
- NNSA partners with the Federal Bureau of Investigation (FBI) to sustain radiological/nuclear device stabilization capabilities in selected cities and provide yearly recurring sustainment training and equipment maintenance.
- Strengthen DOE/NNSA's emergency management policies, practices, and ability to manage and respond to emergencies by sustaining the DOE/NNSA Emergency Operations Center and beginning design work on the Emergency Communications Network.
- Strengthen the ability of the IAEA and key international partners to effectively prepare for and respond to a nuclear or radiological incident.

Naval Reactors

The FY 2017 Budget Request continues NR's core objective of supporting the safe and reliable operation of the Nation's nuclear fleet (73 submarines, 10 aircraft carriers, and 4 research, development, and training platforms), constituting over 45 percent of the Navy's major combatants. This Budget Request supports three major DOE initiatives: *Ohio*-Class Replacement Reactor System Development, Land-based S8G Prototype Refueling Overhaul, and Spent Fuel Handling Recapitalization Project. Funding is also requested for NR federal program direction account for NR federal salaries and benefits.

NNSA Federal Salaries and Expenses

The FY 2017 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, an increase of 60 FTEs (25 above the authorized 1,690) from anticipated FY 2016 levels, and other expenses of the NNSA Federal staff, ensuring appropriate skills in a professional workforce.

Major Outyear Priorities and Assumptions

The total NNSA Future Years Nuclear Security Program (FYNSP) for FY 2017 – 2021 is $69,647,500,000 of which $12,884,000,000 is requested for FY 2017 and $56,763,500,000 is planned to be requested from FY 2018 – 2021. This level of funding is required to support the major elements of FYNSP work outlined above. If funding in any year is lower, NNSA may need to re-adjust projected timelines to complete mission work.

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

In the FY 2017 Budget Request, NNSA's projected support to the DOE Working Capital Fund (WCF) is $80,731,000 of which $43,076,000 will be paid out of FSE; $28,167,000 out of WA; $5,769,000 out of DNN; and $3,719,000 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 $331,700,000 in FY 2017 for Legacy Contractor Pensions split between Weapons Activities and Defense Nuclear Nonproliferation, $46,804,000 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 the contracts. 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 2017 by $56,000,000 million which is covered in the request.

Crosscutting Programs

In FY 2015, the Department was reorganized into three Under Secretariats—Science and Energy, Nuclear Security, and Management and Performance — that recognizes the complex interrelationship among DOE Program Offices. The FY 2017 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 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 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 the National Nuclear Security Administration's Advanced Simulation and Computing (ASC) program. Included in this request is $95,000,000 in FY 2017 for activities and research leading to deployment of exascale capability for national security applications in the early 2020's.

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) and the Minority Serving Institutions Partnership Program (MSIPP). 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 2017, NNSA anticipates spending about $7,700,000 for NGFP support and development activities in the areas of acquisition and project management, nuclear safety and health, facilities management, and technical writing. The MSIPP is a direct-funded program through Site Stewardship and the FY 2017 request is $18,956,000.

Indirect Costs and Other Items of Interest

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 2016.

FY 2016 General Plant Projects

Naval Reactors – Kesselring Site

Project Title	Program	TEC	Project Description	FY 2015 Current	FY 2016 Request	FY 2017 Request	Outyears	Construction Design Estimate
KS Prototype Overhaul Support Facility	NA-30	6,600,000	Constructs a facility that provides 65 long-term office space and supportive administrative space for staff supporting the S8G Prototype Refueling Overhaul, MARF Defueling and Inactivation, and future prototype maintenance and overhaul related activities.	0	6,600,000	0	0	

Weapons Activities – Los Alamos National Laboratories

Project Title	Program	TEC	Project Description	FY 2015 Current	FY 2016 Request	FY 2017 Request	Outyears	Construction Design Estimate
Radioassay and Nondestructive Testing (RANT) Facility Seismic Upgrades	NA-50	7,840,000	Perform a seismic upgrade that would meet International Building Code (IBC). Meeting the latest IBC and DOE requirements positions RANT's Documented Safety Analysis to be resubmitted for DOE approval to operate the HC2 facility and commence shipments again to WIPP.	0	1,500,000	6,340,000	0	440,000

Weapons Activities – Pantex Plant

Project Title	Program	TEC	Project Description	FY 2015 Current	FY 2016 Request	FY 2017 Request	Outyears	Construction Design Estimate
Non-Destructive Laser Gas Sampling, PX	NA-10	6,710,000	Facility modifications required to support reconfiguration of a production bay to perform NDLGS for LEPs and ALTs.	0	1,610,000	3,600,000	1,500,000	700,000

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 2017.

FY 2017 General Plant Projects

Weapons Activities – Lawrence Livermore National Laboratory

Project Title	Program	TEC	Project Description	FY 2015 Current	FY 2016 Request	FY 2017 Request	Outyears	Construction Design Estimate
Site 300 Firing Site Support Systems Upgrade	NA-50	5,000,000	This project will improve several failing and obsolete facility support systems at Site 300's firing sites. Specific scope includes: installing a permanent decontamination area; improving safety and providing a more reliable decontamination area for facility workers; reinforcing outside covered storage area; upgrading water tank, facility evaporator, and a water chiller; renovating the facility's floor.	0	0	5,000,000	0	525,000

Weapons Activities – Nevada National Security Site

Project Title	Program	TEC	Project Description	FY 2015 Current	FY 2016 Request	FY 2017 Request	Outyears	Construction Design Estimate
Infrastructure Replacement for Mission Corridor Consolidation	NA-50	6,300,000	This project will provide improvements to modernize core IT backbone infrastructure supporting core safety, security, emergency services, communications and mission activities at the NNSS. This project procures and installs a prefabricated structure to house HVAC and Power supply equipment and site preparation that supports new communications equipment.	0	0	6,300,000	0	300,000

Weapons Activities – Sandia National Laboratories

Project Title	Program	TEC	Project Description	FY 2015 Current	FY 2016 Request	FY 2017 Request	Outyears	Construction Design Estimate
B6588 (Annular Core Research Reactor) Facility Renovation	NA-50	5,000,000	This project rehabilitates "backbone" and fundamental building systems to sustain reactor operations and mitigate performance risk to the mission.	0	0	5,000,000	0	400,000

Weapons Activities –Y-12 National Security Complex

Project Title	Program	TEC	Project Description	FY 2015 Current	FY 2016 Request	FY 2017 Request	Outyears	Construction Design Estimate
9204-2E Switchgear 814 Replacement	NA-50	5,000,000	Replace switchgear 814 in Building 9204-2E as part of the Nuclear Facility Electrical Modernization portfolio (previously the Electrical Improvements for Nuclear Operations project).	0	0	5,000,000	0	< 1,000,000

Naval Reactors – Naval Reactors Facility, ID

Project Title	Program	TEC	Project Description	FY 2015 Current	FY 2016 Request	FY 2017 Request	Outyears	Construction Design Estimate
NRF Security Upgrades	NA-30	8,000,000	Upgrades the security Limited Area Intrusion Detection System (IDS) by adding a secondary IDS to the entire site perimeter and upgrading cameras and the power and data infrastructure at the NRF.	0	0	300,000	7,700,000	
NRF Vehicle Barrier System	NA-30	6,000,000	Constructs an earthen and/or concrete barrier to achieve the required stand-off distance to the facilities planned to be constructed at the NRF.	350,000	0	5,650,000	0	

50 US Code 2746 requires that if the total estimated cost for construction design in connection with any construction project exceeds $1,000,000, funds for that design must be specifically authorized by law. NNSA requests Congressional Authorization for one General Plan Project exceeding the $1,000,000 design threshold for the following project:

Weapons Activities – Savannah River Site

Project Title	Program	TEC	Project Description	FY 2015 Current	FY 2016 Request	FY 2017 Request	Outyears	Construction Design Estimate
Load Line 6 Upgrades	NA-19	8,500,000	Refurbish, modernize, and increase capacity of the loading line that is used to load LEP's and Major ALT's Gas Transfer Systems.	0	0	4,280,000	4,220,000	1,100,000

General Plant Projects for NNSA

(Dollars in Thousands)

	FY 2015 Enacted	FY 2015 Current	FY 2016 Enacted	FY 2017 Request	FY 2017 vs FY 2016
General Plant Projects					
Kansas City Plant	7,000	7,000	15,950	10,000	-5,950
Sandia National Laboratories	14,404	14,404	29,994	31,900	+1,906
Los Alamos National Laboratory	0	0	0	0	0
Lawrence Livermore National Laboratory	12,596	12,596	10,125	29,890	+19,765
Pantex/Y-12	72,616	72,616	102,400	67,389	-35,011
Savannah River Site	20,960	20,960	19,261	28,675	+9,414
Nevada National Security Site	14,450	14,450	14,750	23,750	+9,000
Bettis Atomic Power Laboratory	0	0	2,818	2,818	+0
Knolls Atomic Power Laboratory	2,900	2,900	5,882	5,882	+0
Total Site, GPP	**144,926**	**144,926**	**201,180**	**200,304**	**-876**

Outyears for NNSA

(Dollars in Thousands)

	FY 2018 Request	FY 2019 Request	FY 2020 Request	FY 2021 Request
General Plant Projects				
Kansas City Plant	10,000	10,000	10,000	10,000
Sandia National Laboratories	50,020	54,200	30,200	46,000
Los Alamos National Laboratory	0	0	0	0
Lawrence Livermore National Laboratory	10,150	14,825	15,755	9,725
Pantex/Y-12	26,000	29,000	30,000	0
Savannah River Site	18,810	18,550	14,575	17,280
Nevada National Security Site	36,400	38,000	41,200	41,500
Bettis Atomic Power Laboratory	7,900	7,115	26,300	9,430
Knolls Atomic Power Laboratory	14,801	19,291	25,899	13,470
Total Site, GPP	**174,081**	**190,981**	**193,929**	**147,405**

Institutional General Plant Projects for NNSA

(Dollars in Thousands)

	FY 2015 Enacted	FY 2015 Current	FY 2016 Enacted	FY 2017 Request	FY 2017 vs FY 2016
Institutional General Plant Projects					
Kansas City Plant	0	0	0	0	0
Sandia National Laboratories	28,224	28,224	20,257	17,960	-2,297
Los Alamos National Laboratory	0	0	0	0	0
Lawrence Livermore National Laboratory	11,470	11,470	14,164	14,392	+228
Pantex/Y-12	4,000	4,000	0	0	0
Savannah River Site	0	0	0	0	0
Nevada National Security Site	0	0	4,300	3,300	-1,000
Bettis Atomic Power Laboratory	0	0	0	0	0
Knolls Atomic Power Laboratory	0	0	0	0	0
Total Site, IGPP	**43,694**	**43,694**	**38,721**	**35,652**	**-3,069**

Outyears for NNSA

(Dollars in Thousands)

	FY 2018 Request	FY 2019 Request	FY 2020 Request	FY 2021 Request
Institutional General Plant Projects				
Kansas City Plant	0	0	0	0
Sandia National Laboratories	17,260	12,673	17,400	0
Los Alamos National Laboratory	0	0	0	0
Lawrence Livermore National Laboratory	12,810	12,045	12,792	13,157
Pantex/Y-12	0	0	0	0
Savannah River Site	0	0	0	0
Nevada National Security Site	900	10,400	4,600	0
Bettis Atomic Power Laboratory	0	0	0	0
Knolls Atomic Power Laboratory	0	0	0	0
Total Site, IGPP	**30,970**	**35,118**	**34,792**	**13,157**

Facilities Maintenance and Repair for NNSA

The Department's Facilities Maintenance and Repair activities are tied to the programmatic missions, goals, and objectives. Facilities Maintenance and Repair activities funded by NNSA are displayed below:

Directed-Funded Maintenance and Repair

(Dollars in Thousands)

	FY 2015 Enacted	FY 2015 Current	FY 2016 Enacted	FY 2017 Request	FY 2017 vs FY 2016
Directed-Funded Maintenance and Repair					
Kansas City Plant	29,683	29,683	23,200	23,200	0
Sandia National Laboratories	4,685	4,685	9,879	10,568	+689
Los Alamos National Laboratory	65,184	65,184	46,068	46,068	0
Lawrence Livermore National Laboratory	12,591	12,591	23,973	28,003	+4,030
Pantex/Y-12	123,789	123,789	131,411	125,058	-6,353
Savannah River Site	27,573	27,573	28,637	28,835	+198
Nevada National Security Site	17,928	17,928	28,095	25,795	-2,300
Bettis Atomic Power Laboratory	10,809	10,809	12,069	13,172	+1,103
Knolls Atomic Power Laboratory	7,072	7,072	7,382	7,390	+8
Total, Directed-Funded Maintenance and Repair	**299,314**	**299,314**	**310,714**	**308,089**	**-2,625**

Outyears for NNSA

(Dollars in Thousands)

	FY 2018 Request	FY 2019 Request	FY 2020 Request	FY 2021 Request
Directed-Funded Maintenance and Repair				
Kansas City Plant	20,200	20,700	21,700	22,300
Sandia National Laboratories	9,258	5,351	5,045	6,891
Los Alamos National Laboratory	46,068	46,068	46,068	46,068
Lawrence Livermore National Laboratory	30,318	29,424	28,391	39,768
Pantex/Y-12	131,235	138,762	145,618	147,907
Savannah River Site	28,709	31,204	37,056	38,025
Nevada National Security Site	16,400	16,712	17,030	17,353
Bettis Atomic Power Laboratory	13,946	21,856	19,208	17,424
Knolls Atomic Power Laboratory	7,623	8,102	8,406	9,029
Total, Directed-Funded Maintenance and Repair	**303,757**	**318,179**	**328,522**	**344,765**

Indirect-Funded Maintenance and Repair

(Dollars in Thousands)

	FY 2015 Enacted	FY 2015 Current	FY 2016 Enacted	FY 2017 Request	FY 2017 vs FY 2016
Indirected-Funded Maintenance and Repair					
Kansas City Plant	0	0	0	0	0
Sandia National Laboratories	86,230	86,230	110,783	99,390	-11,393
Los Alamos National Laboratory	93,581	93,581	98,384	99,552	+1,168
Lawrence Livermore National Laboratory	99,681	99,681	100,637	100,875	+238
Pantex/Y-12	36,172	36,172	28,019	28,121	102
Savannah River Site	4,626	4,626	4,894	5,427	+533
Nevada National Security Site	44,645	44,645	45,611	46,274	+663
Bettis Atomic Power Laboratory	10,307	10,307	11,150	11,264	+114
Knolls Atomic Power Laboratory	16,504	16,504	21,371	19,107	-2,264
Total, Indirected-Funded Maintenance and Repair	**391,746**	**391,746**	**420,849**	**410,010**	**-10,839**

Outyears for NNSA

(Dollars in Thousands)

	FY 2018 Request	FY 2019 Request	FY 2020 Request	FY 2021 Request
Indirected-Funded Maintenance and Repair				
Kansas City Plant	0	0	0	0
Sandia National Laboratories	114,233	98,208	105,007	91,135
Los Alamos National Laboratory	100,738	101,942	103,163	104,403
Lawrence Livermore National Laboratory	101,150	101,150	101,650	101,150
Pantex/Y-12	28,228	28,338	28,454	28,574
Savannah River Site	5,777	6,576	6,849	6,945
Nevada National Security Site	47,153	48,049	48,962	49,892
Bettis Atomic Power Laboratory	12,354	12,227	12,266	12,383
Knolls Atomic Power Laboratory	18,875	18,683	18,032	17,954
Total, Indirected-Funded Maintenance and Repair	**428,508**	**415,173**	**424,383**	**412,436**

Report on FY 2015 Expenditures for Maintenance and Repair

This report responds to legislative language set forth in Conference Report (H.R. Conf. Rep. No. 108-10) accompanying the Consolidated Appropriations Resolution, 2003 (Public Law 108-7) (pages 886-887), which directs the Department of Energy provide an annual year-end report on maintenance expenditures to the Committees on Appropriations. This report compares the actual maintenance expenditures in FY 2015 to the amount planned for FY 2015, including Congressionally directed changes.

Total Costs for Maintenance and Repair

(Dollars in Thousands)

	FY 2015 Actual Cost	FY 2015 Planned Cost Request
Indirected-Funded Maitenance and Repair		
Kansas City Plant	29,683	21,159
Sandia National Laboratories	90,915	164,159
Los Alamos National Laboratory	158,765	186,452
Lawrence Livermore National Laboratory	112,272	118,378
Pantex/Y-12	159,961	139,672
Savannah River Site	32,199	29,191
Nevada National Security Site	62,573	114,555
Bettis Atomic Power Laboratory	21,116	24,815
Knolls Atomic Power Laboratory	23,576	22,038
Total, Indirected-Funded Maitenance and Repair	**691,060**	**820,419**

Homeland Security/Safeguards and Security Crosscut
(Dollars in Thousands)

	FY 2015 Enacted	FY 2015 Current	FY 2016 Enacted	FY 2017 Request	$ Chg.	% Chg.
Homeland Security Program Unique Elements						
Weapons Activities						
Nuclear Counterterrorism Incident Response*						
Emergency Response	142,577	142,577				
National Technical Nuclear Forensics	10,250	10,250				
Emergency Management	5,668	5,668				
Operations Support	14,850	14,850				
Subtotal, NCTIR	173,345	173,345				
Counterrorism & Counterproliferation Programs*	46,093	46,093				
DNN Nuclear Counterrorism & Incident Response Program*						
Emergency Response			139,077	156,955	17,878	12.85%
National Technical Forensics			10,041	11,400	1,359	13.53%
Emergency Management and Operations Center			20,227	34,775	14,548	71.92%
Counterterrorism Response and Capacity Building			1,500	1,500	-	0.00%
Nuclear Counterterrorism Assessment			57,789	61,251	3,462	5.99%
Subtotal Nuclear Counterrorism & Incident Response Program			228,634	265,881	37,247	14.01%
Defense Nuclear Nonproliferation						
Nonproliferation and Verification R&D						
Proliferation Detection	50,000	50,000	50,000	50,000	0	0.00%
Subtotal, NN R&D	50,000	50,000	50,000	50,000	0	0.00%
Global Threat Reduction Initiative**						
Domestic Radiological Material Removal	67,987	67,987				
Domestic Material Protection	20,645	20,645				
Subtotal, GTRI	88,632	88,632				
Global Material Security, Radiological Security**						
Domestic Radiological Material Removal			75,593	67,199		
Domestic Material Protection			17,000	17,000		
			92,593	84,199	(8,394)	-9.07%
Subtotal, HS Program Uniques Elements (Not S&S elements)	358,070	358,070	142,593	134,199	(8,394)	-5.89%
Safeguards and Security Components of Homeland Security						
Weapons Activities						
Defense Nuclear Security						
Protective Forces	378,485	378,485	390,592	387,000	(3,592)	-0.9%
Physical Security Systems	89,866	89,866	85,805	95,564	9,759	11.4%
Information Security	30,432	30,432	29,779	31,776	1,997	6.7%
Personnel Security	34,151	34,151	33,587	33,021	(566)	-1.7%
Material Control and Accountability	28,678	28,678	24,839	26,568	1,729	7.0%
Program Management/Security Program Operations & Planning	74,511	74,511	75,289	83,204	7,915	10.5%
Construction	0	0	13,000	13,000	-	0.0%
Security Improvement Program			30,000	0	(30,000)	
Subtotal, Defense Nuclear Security	636,123	636,123	682,891	670,133	(12,758)	-1.9%
Secure Transportation Asset	219,000	219,924	237,118	282,732	45,614	19.2%
Information Technology and Cybersecurity***						
Cybersecurity						
Infrastructure Program	140,805	140,805	108,188	118,892	10,704	9.9%
Technology Application Development	4,000	4,000	6,000	4,000	(2,000)	-33.3%
Enterprise Secure Computing	10,000	10,000	18,400	23,700	5,300	28.8%
Federal Unclassified Information Technology (not Homeland)	[24,841]	[24,841]	[25,000]	[30,000]		
Subtotal, Information Technology Cyber Security	154,805	154,805	132,588	146,592	14,004	10.6%
Working Capital Fund (CyberOne contribution)****	16,731	16,731	13,696	13,668	(28)	-0.2%
Subtotal, Safeguards and Security within Homeland Security	**1,026,659**	**1,027,583**	**1,066,293**	**1,113,125**	**46,832**	**4.4%**
Total, Homeland Security	**1,384,729**	**1,385,653**	**1,208,886**	**1,247,324**	**38,438**	**3.2%**
Security Investigations	27,000	27,000	30,000	33,000	3,000	10.0%
Total, Safeguards and Security (Inclusive of Security Investigations)	**1,053,659**	**1,054,583**	**1,096,293**	**1,146,125**	**49,832**	**4.5%**

* The Nuclear Counterterrorism Incident Response Program requested under the DNN appropriation in FY 2016. Prior year funding was under Weapons Activities appropriation.

** GTRI elements funded in FY 2016 under GMS Radiological Security (domestic)

*** Federal Unclassified Information Technology is not Homeland Security.

**** CyberOne initiative is funded from direct program NNSA Weapons Activities, DNN, and NR, not Information Technology and Cybersecurity.

Site Estimates

(Dollars in Thousands)

Site	FY 2015 Current	FY 2016 Enacted	FY 2017 FSE	FY 2017 WA	FY 2017 NN	FY 2017 NR	FY 2017 Total
Argonne National Laboratory	42,632	49,706	0	0	52,491	0	52,491
Bechtel Marine Propulsion Corporation	826	1,450	0	1,330	0	0	1,330
Bettis Atomic Power Laboratory	465,370	485,696	0	0	0	513,287	513,287
Brookhaven National Laboratory	12,649	11,526	0	235	11,976	0	12,211
Carlsbad Field Office	0	0	0	0	1,000	0	1,000
Chicago Operations Office	2,180	290	0	0	0	0	0
Consolidated Business Center	933	470	0	0	0	0	0
General Atomics	22,973	24,000	0	24,420	0	0	24,420
Headquarters	1,145,072	1,244,717	299,429	926,220	172,142	130,539	1,528,330
Idaho National Laboratory	213,801	277,270	0	3,065	74,774	150,976	228,815
Idaho Operations Office	20	0	0	0	0	0	0
Kansas City Plant	589,454	615,637	0	715,450	29,472	0	744,922
Kansas City Field Office	6,976	7,328	7,550	0	0	0	7,550
Knolls Atomic Power Laboratory	515,380	596,959	0	0	0	605,118	605,118
Lawrence Berkeley National Laboratory	15,317	11,502	0	0	6,150	0	6,150
Lawrence Livermore National Laboratory	1,107,631	1,197,076	0	1,069,973	113,307	0	1,183,280
Livermore Field Office	17,364	18,074	18,579	0	0	0	18,579
Los Alamos National Laboratory	1,652,187	1,915,485	0	1,575,842	246,247	0	1,822,089
Los Alamos Field Office	13,871	15,241	15,905	0	0	0	15,905
National Energy Technology Laboratory	14,086	9,857	0	8,216	0	0	8,216
Naval Reactors Laboratory Field Office	18,470	18,950	0	0	0	20,200	20,200
Naval Research Laboratory	5,350	6,450	0	6,310	0	0	6,310
Nevada National Security Site	368,752	376,154	0	315,141	81,223	0	396,364
Nevada Field Office	90,272	90,519	17,600	76,057	0	0	93,657
New Brunswick Laboratory	775	272	0	0	267	0	267
NNSA ABQ Complex (all other sites)	447,513	660,481	0	472,691	129,754	0	602,445
NNSA Production Field Office	26,040	30,175	26,022	1,830	4,000	0	31,852
Oak Ridge Institute for Science and Engineering	13,716	10,807	0	100	4,184	0	4,284
Oak Ridge National Laboratory	104,983	117,373	0	5,828	76,358	0	82,186
Oak Ridge Operations Office	97,835	0	0	0	0	0	0
Office of Science and Technical Information	431	429	0	413	15	0	428
Pacific Northwest National Laboratory	313,420	318,611	0	26,067	205,004	0	231,071
Pantex Plant	569,376	661,407	0	698,866	8,868	0	707,734
Princeton Plasma Physics Laboratory	200	0	0	0	0	0	0
Richland Operations Office	1,550	1,425	0	0	6,984	0	6,984
Sandia National Laboratories	1,726,516	1,753,407	0	1,579,907	178,424	0	1,758,331
Sandia Field Office	21,000	21,725	22,379	0	0	0	22,379
Savannah River Operations Office	348,389	334,006	0	0	259,400	0	259,400
Savannah River Site	301,946	306,311	0	250,175	108,262	0	358,437
Savannah River Site Office	6,356	5,211	5,353	1,361	0	0	6,714
Stanford Linear Accelerator Center	1,800	0	0	0	0	0	0
University of Rochester/LLE	67,963	64,264	0	61,830	0	0	61,830
Waste Isolation Pilot Plant	2,000	0	0	0	0	0	0
Westinghouse TRU Solutions (WIPP)	61	51	0	0	56	0	56
Y-12 National Security Complex	1,157,048	1,307,676	0	1,463,820	51,558	0	1,515,378
Adjustments of Prior Year Balances	-133,797	-41,476	0	-42,000	-14,000	0	-56,000
Grand Total	11,396,687	12,526,512	412,817	9,243,147	1,807,916	1,420,120	12,884,000

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 following table provides information required in paragraphs (f)(2) and (f)(3). NNSA does not have information to address paragraph (f)(4), it is the responsibility of individual contractors/employers to determine how to address contract requirements and who will perform the work. The FSE chapter of the budget provides information for (f)(1).

For this report Service Support Contracts were determined using definitions in the OMB Memorandum November 2011 "Management Support Services", the DOE Annual Service Contract Inventory: Special Interest Functions FY 2014, the DOE Acquisition Guide, and expanded to include any other services not otherwise captured that are funded with "Federal Salaries and Expenses." The following services: Management and Operating contracts, contracts for housekeeping, custodial, physical security, and facilities maintenance.

Vendor Name	FTEs	Funding Source
ACTIONET, INC	5.0	Program
ALLEGHENY SCIENCE & TECHNOLOGY CORPORATION	5.0	Program
ALUTIIQ COMMERCIAL ENTERPRISES LLC	10.7	Program Direction
BANDA GROUP INTERNATIONAL,LLC	8.0	Both
CE2 CORPORATION INC	40.1	Program Direction
CENTRAL RESEARCH INC	8.0	Program Direction
CHENEGA GOVERNMENT CONSULTING, LLC	55.5	Program
CONFERENCE OF RADIATION CONTROL PROGRAM DIRECTORS INC	0.3	Program
CORPORATE ALLOCATION SERVICES, INC	20.5	Program
COUNTY OF NYE	4.0	Program
CRITERION SYSTEMS, INC.	50.0	Both
DELTA RESEARCH ASSOCIATES INC	1.0	Program
EXELIS INC	1.5	Program
GENQUEST INC	22.0	Both
GLENN JR, MELTON SAMUEL	0.5	Program
H W & W INC	3.0	Program Direction
HENRY L STIMSON CENTER	2.0	Program
INTERNATIONAL SERVICES AND ADVISORS INC	4.0	Program
JDG ASSOCIATES, INC.	3.5	Program Direction
JG MANAGEMENT SYSTEMS INC	8.0	Both
LINK TECHNOLOGIES INC	9.5	Program
LONGENECKER AND ASSOCIATES, INC	37.5	Both
LTD GLOBAL, LLC	0.5	Program
MELE ASSOCIATES INC	58.0	Program
NAVARRO RESEARCH AND ENGINEERING, INC	29.0	Program
ONPOINT CONSULTING INC	66.0	Program
PARSONS GOVERNMENT SERVICES INC	43.0	Both
PMTECH, INC	8.5	Program
PROJECT ENHANCEMENT CORPORATION	7.3	Both
RANDOLPH CONSTRUCTION SERVICES INC	28.0	Program
REEVES CONSULTING LLC	2.0	Program
SALMON GROUP, INC.	12.4	Both
SES-TECH GLOBAL SOLUTIONS	22.0	Program
SIGMA SCIENCE INC	2.0	Program
SYNERGY SOLUTIONS INCORPORATED	53.0	Both
TECHSOURCE INC	103.0	Both
TETRA TECH INC	0.5	Program
TIME SOLUTIONS LLC	3.1	Program Direction
VECTOR RESOURCE INC	16.0	Both
Grand Total	**753.7**	

Federal Salaries and Expenses

Federal Salaries and Expenses

National Nuclear Security Administration Federal Salaries and Expenses
Proposed Appropriation Language

For necessary expenses for Federal Salaries and Expenses in the National Nuclear Security Administration [$363,766,000] *$412,817,000,* to remain available until September 30, [2017] *2018*, including official reception and representation expenses not to exceed $12,000.

Explanation of Changes

The FY 2017 Budget Request provides funding for the salary, benefits, and support expenses of 1,715 federal full-time equivalents (FTEs) to provide federal oversight of the nuclear security enterprise responsible for managing and executing NNSA's mission. The FY 2017 Request of $412,817,000 reflects a $49,051,000 increase above the FY 2016 Enacted level, which includes a prior year rescission of $19,900,000. This level of funding supports 60 FTEs above the FY 2016 projected level to support increases for appropriate oversight principally in Life Extension Programs (LEPs) and major project management, provides a 1.3 percent cost of living increase, has a 5.5 percent increase in benefit escalation consistent with government-wide projections, funds additional Field Site background investigations, and transfers funding to the Department's Working Capital Fund, primarily for Office Personnel Management (OPM) credit monitoring and the Department's accounting systems (iMANAGE).

Public Law Authorizations

- P.L. 106-65, National Nuclear Security Administration Act, as amended
- P.L. 114-92, National Defense Authorization Act for Fiscal Year 2016

National Nuclear Security Administration Federal Salaries and Expenses [a]

(Dollars in Thousands)

	FY 2015 Enacted	FY 2015 Current	FY 2016 Enacted	FY 2017 Request
Federal Salaries and Expenses	370,000	370,000	383,666	412,817
Rescission of Prior Year Balances	-413	-413	-19,900	0
Total, Net of Rescission	**369,587**	**369,587**	**363,766**	**412,817**

Overview

NNSA's **Federal Salaries and Expenses** pays for costs associated with recruiting, training, and maintaining a federal staff to oversee the execution and management of about $11 billion in weapons activities and nonproliferation funding across the nuclear security enterprise. The FSE account provides funds for the salaries and benefits of 1,715 FTEs, space and occupancy needs, travel costs, support service contractors, training, and other related costs. Approximately 73 percent of all 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. This appropriation also provides for mission support functions in information technology and cybersecurity, financial management, human capital management, corporate project management, legal services, procurement and contract management, safety and health, and cost estimating and program evaluation. The Department of Energy and NNSA work to reduce overlap in mission support functions to minimize the amount of funding required to achieve our mission. NNSA is 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 manages the Department's overseas presence, including placing DOE staff located in foreign countries. NNSA supervises both federal employees and locally employed staff, pays salaries and travel costs, and reimburses the Department of State for mandatory International Cooperative Administrative Support Services (ICASS) and Capital Security Cost Sharing (CSCS) charges. The Department funds its overseas presence through the Working Capital Fund for consistent administrative and operational support to Departmental personnel.

Highlights of the FY 2017 Budget Request

NNSA's FY 2017 Request supports a federal staff level of 1,715 FTEs to support continued operational effectiveness and reduce risks associated with federal management of resources. NNSA's FY 2015 Federal Management Financial Integrity Act (FMFIA) report identified NNSA's current staffing levels as a problem that poses a high risk to the Department because of the lack of federal oversight. NNSA has also benchmarked its current staffing profile for the LEPs and contract management against comparable programs in the Department of Defense. In March 2015, NNSA conducted a staffing level review to include entry-level hiring requirements based on overall organizational succession planning goals, current staffing ratios, organizational retirement trends and retirement eligibility data, and opportunities to address skills mix issues and balances of the current workforce. The results of the study suggested NNSA support a Federal staffing level of approximately 1,740 FTEs in the FSE account. In FY 2016, NNSA will undertake a detailed and comprehensive staffing review to identify the appropriate FTE level and skills set mix to address the pending retirement bow wave, and meet mission needs for anticipated increased work scope in major mission areas, particularly in LEPs and construction projects. In FY 2017, NNSA will fund a staffing level of 1,715, an increase of 60 FTEs
(25 above the authorized 1,690) from anticipated FY 2016 levels, and request an additional 25 for a total of 1,740 FTEs in FY 2018 and the outyears pending the results of a detailed staffing review.

[a] The FY 2015 Consolidated and Further Continuing Appropriations Act, 2015, includes a one-time rescission of prior year balances of $413,000 for Federal Salaries and Expenses. The FY 2016 Consolidated and Further Continuing Appropriations Act, 2016, includes a one-time rescission of prior year balances of $19,900,000 for Federal Salaries and Expenses.

Major Outyear Priorities and Assumptions

Outyear funding levels for the NNSA Federal Salaries and Expenses appropriation total $1,790,716,000 for FY 2018 through FY 2021. The five-year funding plan assumes a 1.3 percent cost of living adjustment and benefit escalation for a federal staff level of 1,740 FTEs. This reflects an additional 25 FTEs from the FY 2017 Request. The funding profile also includes up to 1.5 percent escalation for other non-pay expenses. This escalation is offset by a reduction to Support Services for Corporate Project Management as NNSA transitions from contractor support to federal support, predicated upon increased federal staffing identified in the budget request.

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

The Federal Salaries and Expenses account also funds a majority of NNSA contributions to the Department's Working Capital Fund (WCF). The DOE WCF is a financial management tool for improving the financing and delivery of a range of common administrative services. NNSA's FY 2017 projected contribution to the DOE WCF from the FSE appropriation is estimated at $43,076,000, which reflects increases for iMANAGE and OPM credit monitoring, offset by reductions to Building Occupancy. The Department's budget chapter on the WCF details the programs funded through the WCF.

Entry Level Hires

The NNSA supports programs, such as the NNSA Graduate Fellowship Program (NGFP) and Minority Serving Institutions Partnership Program (MSIPP), to help train and recruit 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 within the nuclear security enterprise.

In FY 2017, the FSE appropriation will provide up to $1,600,000 for NGFP support and development activities.

National Nuclear Security Administration Federal Salaries and Expenses
Funding by Congressional Control

(Dollars in Thousands)

	FY 2015 Enacted	FY 2015 Current	FY 2016 Request	FY 2017 Request	FY 2017 vs FY 2016
NNSA Federal Salaries and Expenses	370,000	370,000	383,666	412,817	+29,151
Rescission of Prior Year Balances	-413	-413	-19,900	0	+19,900
Total, Federal Salaries and Expenses, Net of Rescissions	**369,587**	**369,587**	**363,766**	**412,817**	**+49,051**

Outyears for NNSA Federal Salaries and Expenses

(Dollars in Thousands)

	FY 2018 Request	FY 2019 Request	FY 2020 Request	FY 2021 Request
Total, Federal Salaries and Expenses	**435,595**	**443,518**	**451,640**	**459,963**

National Nuclear Security Administration Federal Salaries and Expenses

Overview

Salaries and Benefits: Provides for the federal staff that oversees the operations 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: Supports 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 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 Related Expenses: Provides funding for Space and Occupancy costs for Headquarters and Field Offices, including NNSA FSE contributions to the DOE WCF and overall operations and maintenance of both leased and federal-owned space, necessary training and skills maintenance of the NNSA federal staff, funding for Field Site investigations; and funding for miscellaneous procurements, including potential settlements, if necessary.

National Nuclear Security Administration Federal Salaries and Expenses

Program Direction

(Dollars in Thousands)

	FY 2015 Enacted	FY 2015 Current	FY 2016 Enacted	FY 2017 Request	FY 2017 vs FY 2016 Request
NNSA Federal Salaries and Expenses					
Headquarters					
Salaries and Benefits	162,979	162,979	183,181	204,634	+21,453
Travel	11,185	11,185	10,798	9,505	-1,293
Support Services	24,005	24,005	26,392	28,174	+1,782
Other Related Expenses	69,766	69,766	53,310	57,116	+3,806
Total, Headquarters	267,935	267,935	273,681	299,429	+25,748
Total, Full Time Equivalents	1,057	1,057	1,137	1,186	49
Livermore Field Office					
Salaries and Benefits	14,224	14,224	15,463	16,220	+757
Travel	318	318	235	290	55
Support Services	587	587	587	587	0
Other Related Expenses	1,560	1,560	1,789	1,482	-307
Total, Livermore Field Office	16,689	16,689	18,074	18,579	+505
Total, Full Time Equivalents	76	76	81	83	2
Los Alamos Field Office					
Salaries and Benefits	12,844	12,844	14,287	14,902	+615
Travel	235	235	200	200	0
Support Services	210	210	210	350	140
Other Related Expenses	532	532	544	453	-91
Total, Los Alamos Field Office	13,821	13,821	15,241	15,905	+664
Total, Full Time Equivalents	75	75	82	83	1

Program Direction, Continued

(Dollars in Thousands)

	FY 2015 Enacted	FY 2015 Current	FY 2016 Enacted	FY 2017 Request	FY 2017 vs FY 2016 Request
Sandia Field Office					
Salaries and Benefits	12,809	12,809	13,500	14,119	+619
Travel	260	260	260	260	0
Support Services	158	158	75	200	125
Other Related Expenses	7,773	7,773	7,890	7,800	-90
Total, Sandia Field Office	21,000	21,000	21,725	22,379	+654
Total, Full Time Equivalents	79	79	81	83	+2
Nevada Field Office					
Salaries and Benefits	13,967	13,967	14,909	15,500	+591
Travel	249	249	243	243	0
Support Services	350	350	350	350	0
Other Related Expenses	1,673	1,673	1,673	1,507	-166
Total, Nevada Field Office	16,239	16,239	17,175	17,600	+425
Total, Full Time Equivalents	77	77	81	82	1
NNSA Production Office (NPO)					
Salaries and Benefits	19,161	19,161	21,679	22,587	+908
Travel	627	627	710	676	-34
Support Services	384	384	271	391	120
Other Related Expenses	2,621	2,621	2,625	2,368	-257
Total, NNSA Production Office	22,793	22,793	25,285	26,022	+737
Total, Full Time Equivalents	116	116	129	131	2

National Nuclear Security Administration Federal Salaries and Expenses[ab]

(Dollars in Thousands)

	FY 2015 Enacted	FY 2015 Current	FY 2016 Enacted	FY 2017 Request	FY 2017 vs FY 2016 Request
Kansas City Field Office					
Salaries and Benefits	5,485	5,485	6,012	6,241	+229
Travel	175	175	191	192	1
Support Services	412	412	296	295	-1
Other Related Expenses	724	724	829	822	-7
Total, Kansas City Field Office	6,796	6,796	7,328	7,550	+222
Total, Full Time Equivalents	35	35	36	38	2
Savannah River Field Office					
Salaries and Benefits	4,324	4,324	4,764	5,007	+243
Travel	143	143	140	160	20
Support Services	97	97	87	87	0
Other Related Expenses	163	163	166	99	-67
Total, Savannah River Field Office	4,727	4,727	5,157	5,353	+196
Total, Full Time Equivalents	26	26	28	29	1
NNSA Federal Salaries and Expenses					
Salaries and Benefits	245,793	245,793	273,795	299,210	+25,415
Travel	13,192	13,192	12,777	11,526	-1,251
Support Services	26,203	26,203	28,268	30,434	+2,166
Other Related Expenses	84,812	84,812	68,826	71,647	+2,821
Total, NNSA Federal Salaries and Expenses	370,000	370,000	383,666	412,817	+29,151
Total, FTEs Requested	1,541	1,541	1,655	1,715	60

[a] The table reflects current year funding used for salaries and benefits. In FY 2015, a total of $262,553,000 was spent on salaries and benefits, of which $245,793,000 was FY 2015 funding and $16,760,000 was prior year balances. Prior year balances are projected to be used to fully fund salaries and benefits in the amount of $14,000,000 in FY 2016 and $6,500,000 in FY 2017.

[b] FY 2015 and FY 2016 are in terms of the Enacted exclusive of rescissions.

National Nuclear Security Administration Federal Salaries and Expenses

Support Services and Other Related Expenses

(Dollars in Thousands)

	FY 2015 Enacted	FY 2015 Current	FY 2016 Enacted	FY 2017 Request	FY 2017 vs FY 2016 Request
Support Services					
Management and Professional Services	16,165	16,165	18,230	18,690	460
Environmental Safety and Health Support	175	175	175	175	0
Corporate Project Management Support	9,863	9,863	9,863	11,569	1,706
Total, Support Services	**26,203**	**26,203**	**28,268**	**30,434**	**2,166**
Other Related Expenses					
Training	4,670	4,670	5,964	5,964	0
Space and Occupancy Costs	37,072	37,072	15,111	14,660	-451

National Nuclear Security Administration Federal Salaries and Expenses [a]

Support Services and Other Related Expenses, Continued

(Dollars in Thousands)

	FY 2015 Enacted	FY 2015 Current	FY 2016 Enacted	FY 2017 Request	FY 2017 vs FY 2016 Request
Headquarters Working Capital Fund (WCF)					
Supplies	502	502	429	460	31
Mail Services	676	676	646	713	67
Copying Service	730	730	710	883	173
Printing and Graphics	367	367	361	332	-29
Building Occupancy	12,157	12,157	18,894	14,720	-4,174
Telecommunications	5,160	5,160	5,235	5,212	-23
Procurement (DCAA)	210	210	141	152	11
Corporate Training Services	218	218	409	443	34
Project Management (PMCDP)	368	368	346	368	22
iMANAGE	3,463	3,463	2,558	5,971	3,413
Financial Statement Audits	77	77	0	0	0
Internal Control (A-123)	36	36	0	0	0
Indirect	0	0	0	0	0
Pensions	65	65	0	0	0
Overseas Representation	10,246	10,246	11,342	11,332	-10
Interagency Transfers to GSA	2,199	2,199	0	2,248	2,248
Health Services	392	392	300	242	-58
TOTAL, Headquarters Working Capital Fund (WCF)	36,866	36,866	41,371	43,076	1,705
Other Expenses					
Other Services	6,192	6,192	6,368	7,935	1,567
Reception and representation	12	12	12	12	0
Subtotal, Other Expenses	6,204	6,204	6,380	7,947	1,567
Total, Other Related Expenses	**84,812**	**84,812**	**68,826**	**71,647**	**2,821**

[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.

National Nuclear Security Administration Federal Salaries and Expenses

Outyears

(Dollars in Thousands)

	FY 2018 Request	FY 2019 Request	FY 2020 Request	FY 2021 Request
NNSA Federal Salaries and Expenses				
Headquarters				
Salaries and Benefits	219,999	225,497	231,135	236,912
Travel	9,648	9,794	9,794	9,794
Support Services	26,953	25,714	25,714	25,714
Other Related Expenses	62,960	63,768	63,768	63,768
Total, Headquarters	319,560	324,773	330,411	336,188
Total, Full Time Equivalents	1,211	1,211	1,211	1,211
Livermore Field Office				
Salaries and Benefits	16,626	17,042	17,468	17,905
Travel	294	298	298	298
Support Services	596	605	605	605
Other Related Expenses	1,504	1,527	1,527	1,527
Total, Livermore Field Office	19,020	19,472	19,898	20,335
Total, Full Time Equivalents	83	83	83	83
Los Alamos Field Office				
Salaries and Benefits	15,275	15,657	16,048	16,449
Travel	203	206	206	206
Support Services	355	360	360	360
Other Related Expenses	460	467	467	467
Total, Los Alamos Field Office	16,293	16,690	17,081	17,482
Total, Full Time Equivalents	83	83	83	83

Outyears, Continued

(Dollars in Thousands)

	FY 2018 Request	FY 2019 Request	FY 2020 Request	FY 2021 Request
Sandia Field Office				
Salaries and Benefits	14,472	14,834	15,205	15,585
Travel	264	268	268	268
Support Services	203	206	206	206
Other Related Expenses	7,917	8,036	8,036	8,036
Total, Sandia Field Office	22,856	23,344	23,715	24,095
Total, Full Time Equivalents	83	83	83	83
Nevada Field Office				
Salaries and Benefits	15,888	16,285	16,692	17,109
Travel	247	251	251	251
Support Services	355	360	360	360
Other Related Expenses	1,530	1,553	1,553	1,553
Total, Nevada Field Office	18,020	18,449	18,856	19,273
Total, Full Time Equivalents	82	82	82	82
NNSA Production Office (NPO)				
Salaries and Benefits	23,152	23,731	24,324	24,932
Travel	686	696	696	696
Support Services	397	403	403	403
Other Related Expenses	2,404	2,440	2,440	2,440
Total, NNSA Production Office	26,639	27,270	27,863	28,471
Full Time Equivalents	131	131	131	131

National Nuclear Security Administration Federal Salaries and Expenses

Outyears, Continued

(Dollars in Thousands)

	FY 2018 Request	FY 2019 Request	FY 2020 Request	FY 2021 Request
Kansas City Field Office				
Salaries and Benefits	6,397	6,557	6,721	6,889
Travel	195	198	198	198
Support Services	299	303	303	303
Other Related Expenses	834	847	847	847
Total, Kansas City Field Office	7,725	7,905	8,069	8,237
Total, Full Time Equivalents	38	38	38	38
Savannah River Field Office				
Salaries and Benefits	5,132	5,260	5,392	5,527
Travel	162	164	164	164
Support Services	88	89	89	89
Other Related Expenses	100	102	102	102
Total, Savannah River Field Office	5,482	5,615	5,747	5,882
Total, Full Time Equivalents	29	29	29	29
NNSA Federal Salaries and Expenses				
Salaries and Benefits	316,941	324,863	332,985	341,308
Travel	11,699	11,875	11,875	11,875
Support Services	29,246	28,040	28,040	28,040
Other Related Expenses	77,709	78,740	78,740	78,740
Total, NNSA Federal Salaries and Expenses	435,595	443,518	451,640	459,963
Total, FTEs Requested	1,740	1,740	1,740	1,740

National Nuclear Security Administration Federal Salaries and Expenses

Support Services and Other Related Expenses

(Dollars in Thousands)

	FY 2018 Request	FY 2019 Request	FY 2020 Request	FY 2021 Request
Support Services				
Management and Professional Services	19,083	19,749 0	19,566	19,391
Environmental Safety and Health Support	178	178	178	178
Corporate Project Management Support	9,985	8,114	8,297	8,472
Total, Support Services	**29,246**	**28,040**	**28,040**	**28,040**
Other Related Expenses				
Training	6,053	6,145	6,145	6,145
Space and Occupancy Costs	14,880	15,102	15,102	15,102

National Nuclear Security Administration Federal Salaries and Expenses

Support Services and Other Related Expenses, Continued

(Dollars in Thousands)

	FY 2018 Request	FY 2019 Request	FY 2020 Request	FY 2021 Request
Headquarters Working Capital Fund (WCF)				
Supplies	467	474	474	474
Mail Services	724	735	735	735
Copying Service	896	910	910	910
Printing and Graphics	337	342	342	342
Building Occupancy	19,962	20,160	20,160	20,160
Telecommunications	5,290	5,370	5,370	5,370
Procurement (DCAA)	154	157	157	157
Corporate Training Services	450	456	456	456
Project Management (PMCDP)	374	379	379	379
iMANAGE	6,061	6,151	6,151	6,151
Financial Statement Audits	0	0	0	0
Internal Control (A-123)	0	0	0	0
Indirect	0	0	0	0
Pensions	0	0	0	0
Overseas Representation	11,502	11,675	11,675	11,675
Interagency Transfers to GSA	2,248	2,248	2,248	2,248
Health Services	246	249	249	249
TOTAL, Headquarters Working Capital Fund	48,709	49,305	49,305	49,305
Other Expenses				
Other Services	8,054	8,175	8,175	8,175
Reception and representation	12	12	12	12
Subtotal, Other Expenses	8,066	8,187	8,187	8,187
Total, Other Related Expenses	**77,709**	**78,740**	**78,740**	**78,740**

National Nuclear Security Administration Federal Salaries and Expenses
Program Direction

Activities and Explanation of Changes

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs. FY 2016
Salaries and Benefits $273,795,000	**Salaries and Benefits $299,210,000**	**Salaries and Benefits +$25,415,000**
• $287,795,000 is projected to be spent on salary and benefits in FY 2016, of which $273,795,000 will be from FY 2016 enacted levels and $14,000,000 from prior year balances. • Provides support for an NNSA federal staff of 1,655 full-time equivalents (FTEs) with the use of prior year balances. Includes payroll escalation including benefit escalation, performance pay increases, and +1.3% for the calendar year 2016 pay raise (cost of living adjustment).	• $305,710,000 is projected to be spent on salary and benefits in FY 2017, of which $299,210,000 will be from the FY 2017 requested level and $6,500,000 from projected prior year balances. • Provides support for an NNSA federal staff of 1,715 full-time equivalents (FTEs). Includes payroll escalation including benefit escalation, performance pay increases, and +1.3% for the calendar year 2017 pay raise (cost of living adjustment). **FY 2018-FY 2021** • Provides support for a staffing level of 1,740 FTEs. • NNSA will continue to reshape the workforce to ensure future mission needs are met. • Reflects pay escalation of 2.5% through the FYNSP.	• The increase reflects the difference in the use of unobligated balances ($7,500,000) and shaping the workforce for future mission needs ($17,915,000). It reflects an increase of 60 FTEs (25 above the authorized 1,690) for appropriate oversight principally in Life Extension Programs and major project management, and entry level hires needed to replenish critical technical skills; and a 1.3% cost of living adjustment (COLA), other pay escalation, and 5.5% benefit escalation.
Travel $12,777,000	**Travel $11,526,000**	**Travel -$1,251,000**
• Supports domestic and foreign travel necessary to conduct NNSA business. • Reflects NNSA efficiencies achieved in support of the Executive Order "Promoting Efficient Spending."	• Supports domestic and foreign travel necessary to conduct NNSA business. **FY 2018-FY 2021** • Reflects escalation of up to 1.5% through FYNSP.	• Reflects travel efficiencies.
Support Services $28,268,000	**Support Services $30,434,000**	**Support Services +$2,166,000**
• Includes Management and Professional Services; Environment Safety and Health support; NNSA Graduate Fellowship Program support; and	• Includes Management and Professional Services; Environment Safety and Health support; NNSA Graduate Fellowship Program support; and	• Reflects escalation and increased workload (+$460,000) and an increase in Corporate Project Management (+$1,706,000). Corporate Project Management will be reduced across the FYNSP

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs. FY 2016
Corporate Project Management to support the NNSA federal staff.	Corporate Project Management to support the NNSA federal staff. **FY 2018-FY 2021** • Reflect escalation of up to 1.5% through FYNSP. • Corporate Project Management reflects a reduction across the FYNSP due to the transition from contractor support to federal support, predicated upon increased federal staffing identified in the budget request.	due to the transition from contractor support to federal support, predicated upon increased federal staffing identified in the budget.
Other Related Expenses $68,826,000	**Other Related Expenses $71,647,000**	**Other Related Expenses +$2,821,000**
• Provides funding for Space and Occupancy costs at Headquarters and field sites; includes the contribution to the DOE Working Capital Fund 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 Working Capital Fund 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. **FY 2018-FY 2021** • Reflects escalation of up to 1.5% through the FYNSP.	• Reflects an increase of +$1,705,000 for Working Capital Fund expenses primarily for iMANAGE and OPM credit monitoring, offset by a reduction to Building Occupancy. • Reflects an increase of +$2,248,000 for Field Site background investigations. • Reflects a decrease of -$1,132,000 for projected efficiencies.

National Nuclear Security Administration Federal Salaries and 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 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021
Federal Administrative Costs - Maintain NNSA Federal Salaries and Expenses 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 %	5.9 %	5.9 %	5.9%	5.9%
Result	3.9 %						
Endpoint Target	In keeping with OMB and DOE expectations that administrative costs be minimized, maintain the NNSA Federal Salaries and Expenses federal administrative costs as a percentage of total Weapons Activities and Defense Nuclear Nonproliferation program costs at less than 6%.						

Department Of Energy

FY 2017 Congressional Budget

Funding By Appropriation By Site

($K)

Office of the Administrator	FY 2015 Current	FY 2016 Enacted	FY 2017 Request
Kansas City Site Office			
Office of the Administrator			
Office of the Administrator	0	0	0
Total, Kansas City Site Office	**0**	**0**	**0**
Livermore Site Office			
Office of the Administrator			
Office of the Administrator	0	0	0
Total, Livermore Site Office	**0**	**0**	**0**
Los Alamos Site Office			
Office of the Administrator			
Office of the Administrator	0	0	0
Total, Los Alamos Site Office	**0**	**0**	**0**
Nevada Field Office			
Office of the Administrator			
Office of the Administrator	0	0	0
Total, Nevada Field Office	**0**	**0**	**0**
NNSA Production Office (NPO)			
Office of the Administrator			
Office of the Administrator	0	0	0
Total, NNSA Production Office (NPO)	**0**	**0**	**0**
Sandia Site Office			
Office of the Administrator			
Office of the Administrator	0	0	0
Total, Sandia Site Office	**0**	**0**	**0**
Savannah River Site Office			
Office of the Administrator			
Office of the Administrator	0	0	0
Total, Savannah River Site Office	**0**	**0**	**0**
Washington Headquarters			
Office of the Administrator			
Office of the Administrator	0	0	0
Total, Washington Headquarters	**0**	**0**	**0**
Total, Office of the Administrator	**0**	**0**	**0**

Department Of Energy

FY 2017 Congressional Budget

Funding By Appropriation By Site

($K)

Federal Salaries and Expenses	FY 2015 Current	FY 2016 Enacted	FY 2017 Request
Kansas City Site Office			
Federal Salaries and Expenses			
Federal Salaries and Expenses	6,796	7,328	7,550
Total, Kansas City Site Office	**6,796**	**7,328**	**7,550**
Livermore Site Office			
Federal Salaries and Expenses			
Federal Salaries and Expenses	16,689	18,074	18,579
Total, Livermore Site Office	**16,689**	**18,074**	**18,579**
Los Alamos Site Office			
Federal Salaries and Expenses			
Federal Salaries and Expenses	13,821	15,241	15,905
Total, Los Alamos Site Office	**13,821**	**15,241**	**15,905**
Nevada Field Office			
Federal Salaries and Expenses			
Federal Salaries and Expenses	16,239	17,175	17,600
Total, Nevada Field Office	**16,239**	**17,175**	**17,600**
NNSA Production Office (NPO)			
Federal Salaries and Expenses			
Federal Salaries and Expenses	22,793	25,285	26,022
Total, NNSA Production Office (NPO)	**22,793**	**25,285**	**26,022**
Sandia Site Office			
Federal Salaries and Expenses			
Federal Salaries and Expenses	21,000	21,725	22,379
Total, Sandia Site Office	**21,000**	**21,725**	**22,379**
Savannah River Site Office			
Federal Salaries and Expenses			
Federal Salaries and Expenses	4,727	5,157	5,353
Total, Savannah River Site Office	**4,727**	**5,157**	**5,353**
Washington Headquarters			
Federal Salaries and Expenses			
Federal Salaries and Expenses	267,935	273,681	299,429
Total, Washington Headquarters	**267,935**	**273,681**	**299,429**
Total, Federal Salaries and Expenses	**370,000**	**383,666**	**412,817**

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, [and the purchase of not to exceed 4 passenger vehicles, $8,846,948,000] $*9,285,147,000* to remain available until expended: Provided, That [$9,718,000] *$103,600,000* shall be available until September 30, [2017] *2018*, for program direction. Provided further, That of the unobligated balances from prior year appropriations available under this heading, $42,000,000 is hereby rescinded: Provide further, that no amounts may be rescinded from amounts that were 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.

Explanation of Change

The FY 2017 Budget Request provides a 4.5% increase from the FY 2016 Enacted Level. Increased funding is requested for Infrastructure and Operations to halt the growth in deferred maintenance; dispose of the Kansas City Bannister Federal Complex; and increase investments to upgrade aging infrastructure to address safety and programmatic risks, improve productivity, and lower operating costs. This Request also increases funding for Uranium Processing Facility (UPF) to complete the design, and support continued construction on approved subprojects. The Directed Stockpile Work Program continues to maintain the current stockpile, conduct three life extension programs and a major alteration in support of the Nuclear Weapons Council (NWC) approved 3+2 Strategy. Consistent with the Nuclear Posture Review (NPR), this strategy enables the U.S. to maintain a strategic deterrence and stability at lower nuclear force numbers while maintaining a safe, secure, and effective nuclear arsenal. The Request increases funding for the W88 Mod 370 program due to changes in cost estimates. The Request also includes funding to increase dismantlement quantities to accelerate the completion of all weapons retired prior to FY 2009 by the end of FY 2021 (one year earlier than previous plans). Research, Development, Test, and Evaluation (RDT&E) reflects an increase in support of Exascale computing and enhanced subcritical experiment capabilities. The Request includes increased funding for Secure Transportation Asset for conceptual design and systems prototyping of the Mobile Guardian Transporter (MGT).

Public Law Authorizations

- P.L. 106-65, National Nuclear Security Administration Act, as amended
- P.L. 114-92, National Defense Authorization Act for Fiscal Year 2016

Weapons Activities

(Dollars in Thousands)

	FY 2015 Enacted	FY 2015 Current	FY 2016 Enacted	FY 2017 Request
Weapons Activities	8,231,770	8,232,020	8,846,948	9,285,147
Rescission of Prior Year Balances	-51,411	-51,411	0	-42,000
Total Weapons Activities	8,180,359	8,180,609	8,846,948	9,243,147

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

A workforce of approximately 30,000 people conducts these programs primarily at eight sites. These programs are managed by a Federal workforce, composed of civilian and military staffs that are ultimately accountable to Congress, the President, and the public. Additional details about these programs can be found in the FY 2017 Stockpile Stewardship and Management Plan (SSMP), which is planned for release on March 15, 2016.

Highlights and Major Changes in the FY 2017 Budget

The FY 2017 Request includes a significant increase for Infrastructure and Operations to arrest the growth in deferred maintenance; dispose of the Kansas City Bannister Federal Complex; increase investments for upgrading aging infrastructure to address safety and programmatic risks, improve productivity, and lower operating costs. For UPF, the increase is to support the execution and construction to meet completion by FY 2025 while maintaining a total cost of $6,500,000,000. The Request for Directed Stockpile Work (DSW) includes increases to transition the W88 Alt 370 to Phase 6.4 including CHE Refresh, to maintain the FY 2025 First Production Unit (FPU) for the W80-4 LEP, and to accelerate the dismantlement of all weapons retired prior to FY 2009 by the end of FY 2021 (one year earlier than previous plans). Increased funding is requested for Research, Development, Test, and Evaluation (RDT&E) for Exascale computing and enhanced subcritical experiment capabilities. An increase is requested for Secure Transportation Asset for the development and testing of the selected alternative for the Mobile Guardian Transporter (MGT). These increases are partially offset by a proposed change in strategy for reimbursing Management and Operating (M&O) contractor pension costs by capping reimbursement to normal cost. This change is expected to result in cost avoidance of approximately $84,000,000 in FY 2017 and $277,000,000 over the Future Years Nuclear Security Plan (FYNSP) period which will be used to address some programmatic and infrastructure issues. Please see NNSA Pension Exhibit in Volume II of the FY 2017 Department of Energy (DOE) Budget Request for more information regarding the pension financing strategy explanation of change.

The major elements of the appropriation highlights include the following:

Directed Stockpile Work

Directed Stockpile Work 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. For FY 2017, DSW will transition the W88 Alt 370 activities from Phase 6.3 (Development Engineering) to Phase 6.4 (Production Engineering) in accordance with the integrated schedule towards a FY 2020 FPU, the 28 percent increase over the FY 2016 Enacted Level largely reflects revised cost estimates of the CHE refresh; and the W80-4 LEP will ramp up at a slower pace than planned in the FY 2016-2020 FYNSP. Planned technology maturation activities in Phase 6.2 (Design Definition and Cost Study) will be reduced, but the slower ramp up is not expected to impact planned FPU in FY 2025 in support of the Air Force Long Range Stand Off (LRSO) program. Increases are also included for Plutonium Sustainment to fabricate four to five

development (DEV) W87 pits and in Weapons Dismantlement and Disposition to make progress towards meeting the commitment to accelerate dismantlements.

Research, Development, Test, and Evaluation (RDT&E) Programs

This program focuses on RDT&E efforts to develop and maintain critical capabilities, tools, and processes needed to support science based stockpile stewardship, refurbishment, and continued certification of the stockpile over the long-term in the absence of underground nuclear testing. For FY 2017, focus will be on annual assessments and will provide for increases in four key areas to support future LEP options and system certification including: Hydrodynamic and subcritical experiments, Enhanced Capabilities for Subcritical Experiments, Certification Readiness Exercises, and Assessment of the performance of U.S. nuclear weapons in hostile environments. The Inertial Confinement Fusion Ignition and High Yield program continues operations at NNSA's three major high energy density facilities (the National Ignition Facility, the Z Pulsed Power facility, and Omega) with the goal of providing key data that reduces uncertainty in calculations of nuclear weapons performance and builds on previous work and accomplishments.

Infrastructure and Operations (Formerly Readiness in Technical Base and Facilities)

This program maintains, operates, and modernizes the National Nuclear Security Administration (NNSA) infrastructure in a safe, secure, and cost-effective manner to enable program results. Infrastructure and Operations activities 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 through Capabilities Based Investments and Line Item Construction projects. For FY 2017, funding will continue the stabilization of deferred maintenance, dispose of the Kansas City Bannister Federal Complex, and 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 to complete the design of the Uranium Processing Facility (UPF), and associated buildings, support structures and process equipment. The increase also supports continued construction in approved subprojects supporting UPF infrastructure and site preparation activities.

Secure Transportation Asset

This program supports the safe, secure movement of nuclear weapons, special nuclear material, and weapon components to meet projected DOE, Department of Defense (DOD), and other customer requirements. The Program Direction in this account provides for the secure transportation workforce, including the Federal agents. In FY 2017, the STA will continue asset modernization and workforce capability initiatives. These initiatives include restoration of Federal agent strength levels to 370, the Safeguards Transporter (SGT) Risk Reduction Initiatives to manage the SGT beyond its design life, to design and develop systems for the selected SGT replacement referred to as the Mobile Guardian Transporter (MGT), deployment of Mission Management System (MMS) Phase I, and replacement of vehicles and tractors.

Defense Nuclear Security

This subprogram provides protection for NNSA personnel, facilities, and nuclear weapons and materials from a full spectrum of threats, ranging from local security incidents to terrorism. Provides for safeguards and security requirements including protective forces and systems at NNSA sites. In FY 2017, the Budget Request includes funding to vacant positions in key security program areas at the sites, such as classification protection, technical surveillance countermeasures, and nuclear materials measurements, accounting, and physical inventory. It also supports increased maintenance for existing site security systems, and includes preliminary planning and design funds for future line item construction projects for Perimeter Intrusion Detection and Assessment Systems (PIDAS) at the Pantex and Y-12 sites. The Security Improvements Program (SIP) was created with $30,000,000 in one-time FY 2016 funds to begin to address 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 2017 no funds are requested.

Information Technology and Cybersecurity

This subprogram provides support to the national nuclear security enterprise, leading Federal efforts to research and develop information technology and cybersecurity solutions, including continuous monitoring, and security technologies (i.e., identity, credential, and access management) to help meet increased proliferation-resistance and security. In addition, by consolidating and transitioning many IT services to more efficiently run data centers, the program indirectly supports the

climate goals mission of DOE. In FY 2017, the program will support the recapitalization of the Enterprise Secure Network, modernize the Cybersecurity infrastructure, implement the Identity Control and Access Management project at NNSA Headquarters and site elements, implement 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 Information Technology (IT) services, consistent with the DOE Cyber Strategy.

Crosscutting programs

In FY 2015, the Department was reorganized into three Under Secretariats—Science and Energy, Nuclear Security, and Management and Performance —that recognizes the complex interrelationship among DOE Program Offices. The FY 2017 Budget Request continues crosscutting programs which coordinate across the Department and seek 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) will be 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 and applied research advances in areas such as climate and energy modeling, including combustion systems and nuclear reactor design. Exascale systems' computational power is needed for increasing 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 contributes to DOE support of the cross-agency National Strategic Computing Initiative with the Departments of Defense, Commerce, Treasury, National Science foundation, and others.

Major Outyear Priorities and Assumptions

Outyear funding levels for the Weapons Activities appropriation total $40,160,657,000 for FY 2018 through FY 2021.

The priorities for the Weapons Activities appropriation are:

- Accomplish required stockpile maintenance activities to sustain the existing stockpile.
- Execute the NWC approved life extension program (LEP) for the B61-12, with completion of a FPU no later than second-quarter FY 2020.
- Complete W76 LEP to meet the current deliverables and submarine deployment requirements in agreement with the Department of the Navy.
- Transition the W88 Alt 370 activities from Phase 6.3 Development Engineering to Phase 6.4 Production Engineering (to include a conventional high explosive refresh) in accordance with the integrated schedule to continue progress towards a FY 2020 FPU.
- Continue 6.2/2A activities and technology maturation for the W80-4 LEP to achieve a FY 2025 FPU in support of the Air Force LRSO program.
- Execute RDT&E activities supporting 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.
- Begin the process to accelerate retired weapons dismantlements by 20%.
- Continue to focus on modernizing NNSA's infrastructure to reduce mission and safety risks, and seek operational efficiencies by deactivating facilities that are no longer needed, thereby reducing operations, maintenance, and recapitalization requirements.

DOE Working Capital Fund (WCF) Support
DOE WCF Support from the NNSA Weapons Activities appropriation projected contribution to the DOE WCF for FY 2017 is $28,167,000. This funding covers certain shared enterprise activities including managing enterprise-wide systems and data, 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 the contracts. 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. NNSA's Budget Request supports the increased costs. These contracts will be paid through the Legacy Contractor Pension line item.

Entry Level Hires
The NNSA supports a variety of programs to help train and potentially 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 the Minority Serving Institutions Partnership Program (MSIPP). 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 2017, the programs anticipates spending about $2,900,000 for NGFP support and development activities in the areas of acquisition and project management, nuclear safety and health, facilities management, and technical writing.

Weapons Activities
Funding by Congressional Control

(Dollars in Thousands)

	FY 2015 Enacted	FY 2015 Current	FY 2016 Enacted	FY 2017 Request	FY 2017 vs FY 2016
Directed Stockpile Work					
Life Extension Programs and Major Alterations					
B61 Life Extension Program	643,000	644,420	643,300	616,079	-27,221
W76 Life Extension Program	259,168	234,168	244,019	222,880	-21,139
W78/88-1 Life Extension Program	0	0	0	0	0
W88 Alt 370	165,400	204,400	220,176	281,129	+60,953
Cruise Missile Warhead Life Extension Study	9,418	10,360	0	0	0
W80-4 Life Extension Program	0	0	195,037	220,253	+25,216
Total, Life Extension Programs and Major Alterations	**1,076,986**	**1,093,348**	**1,302,532**	**1,340,341**	**+37,809**
Stockpile Systems					
B61 Stockpile Systems	109,615	114,615	52,247	57,313	+5,066
W76 Stockpile Systems	45,728	41,564	50,921	38,604	-12,317
W78 Stockpile Systems	62,703	59,833	64,092	56,413	-7,679
W80 Stockpile Systems	70,610	75,610	68,005	64,631	-3,374
B83 Stockpile Systems	63,136	63,136	42,177	41,659	-518
W87 Stockpile Systems	91,255	89,005	89,299	81,982	-7,317
W88 Stockpile Systems	88,060	86,625	115,685	103,074	-12,611
Total, Stockpile Systems	**531,107**	**530,388**	**482,426**	**443,676**	**-38,750**
Weapons Dismantlement and Disposition	**50,000**	**50,000**	**52,000**	**68,984**	**+16,984**
Stockpile Services					
Production Support	350,942	352,442	447,527	457,043	+9,516
Research and Development Support	25,500	25,500	41,059	34,187	-6,872
Research and Deveopment Certification and Safety	160,000	160,000	185,000	156,481	-28,519
Managemement, Technology, and Production	226,000	226,000	264,994	251,978	-13,016
Plutonium Sustainment	132,000	132,000	0	0	0
Tritium Readiness	140,053	140,053	0	0	0
Total, Stockpile Services	**1,034,495**	**1,035,995**	**938,580**	**899,689**	**-38,891**
Strategic Materials					
Uranium Sustainment	0	0	32,916	20,988	-11,928
Plutonium Sustainment	0	0	174,698	184,970	+10,272
Tritium Sustainment	0	0	104,600	109,787	+5,187
Domestic Uranium Enrichment	0	0	50,000	50,000	0
Strategic Materials Sustainment	0	0	250,040	212,092	-37,948
Total, Strategic Materials	**0**	**0**	**612,254**	**577,837**	**-34,417**
Total, Directed Stockpile Work	**2,692,588**	**2,709,731**	**3,387,792**	**3,330,527**	**-57,265**

(Dollars in Thousands)

	FY 2015 Enacted	FY 2015 Current	FY 2016 Enacted	FY 2017 Request	FY 2017 vs FY 2016
Research, Development, Test and Evaluation (RDT&E)					
Science					
Advanced Certification	58,747	58,747	58,747	58,000	-747
Primary Assessment Technologies	109,000	109,000	95,512	99,000	+3,488
Dynamic Materials Properties	109,000	109,000	100,400	106,000	+5,600
Advanced Radiography	47,000	47,000	45,700	50,500	+4,800
Secondary Assessment Technologies	88,344	88,344	72,900	76,000	+3,100
Academic Alliances and Partnerships	0	0	49,800	52,484	+2,684
Total, Science	**412,091**	**412,091**	**423,059**	**441,984**	**+18,925**
Engineering					
Enhanced Surety	52,003	52,003	50,821	37,196	-13,625
Weapon Systems Engineering Assessment Technology	20,832	20,832	17,371	16,958	-413
Nuclear Survivability	25,371	25,371	24,461	43,105	+18,644
Enhanced Surveillance	37,799	37,799	38,724	42,228	+3,504
Total, Engineering	**136,005**	**136,005**	**131,377**	**139,487**	**+8,110**
Inertial Confinement Fusion Ignition and High Yield					
Ignition	77,994	77,994	76,334	75,432	-902
Support of Other Stockpile Programs	23,598	23,598	22,843	23,363	+520
Diagnostics, Cryogenics and Experimental Support	61,297	61,297	58,587	68,696	+10,109
Pulsed Power Inertial Confinement Fusion	5,024	5,024	4,963	5,616	+653
Joint Program in High Energy Density Laboratory Plasmas	9,100	9,100	8,900	9,492	+592
Facility Operations and Target Production	335,882	335,882	339,423	340,360	+937
Total, Inertial Confinement Fusion Ignition and High Yield	**512,895**	**512,895**	**511,050**	**522,959**	**+11,909**
Advanced Simulation and Computing	**598,000**	**598,000**	**623,006**	**663,184**	**+40,178**
Advanced Manufacturing Development					
Additive Manufacturing	12,600	12,600	12,600	12,000	-600
Component Manufacturing Development	75,000	75,000	99,656	46,583	-53,073
Process Technology Development	19,600	19,600	17,800	28,522	+10,722
Advanced Manufacturing Development	**107,200**	**107,200**	**130,056**	**87,105**	**-42,951**
Total, RDT&E	**1,766,191**	**1,766,191**	**1,818,548**	**1,854,719**	**+36,171**

(Dollars in Thousands)

	FY 2015 Enacted	FY 2015 Current	FY 2016 Enacted	FY 2017 Request	FY 2017 vs FY 2016
Infrastructure and Operations (formerly RTBF)					
Operating					
Operations of Facilities					
Kansas City National Security Campus (formerly Kansas City Plant)	125,000	125,000	100,250	101,000	+750
Lawrence Livermore National Laboratory	71,000	71,000	70,671	70,500	-171
Los Alamos National Laboratory	198,000	198,000	196,460	196,500	+40
Nevada National Security Site	89,000	89,000	89,000	92,500	+3,500
Pantex	75,000	72,353	58,021	55,000	-3,021
Sandia National Laboratories	106,000	106,000	115,300	118,000	+2,700
Savannah River Site	81,000	81,000	80,463	83,500	+3,037
Y-12 National Security Complex	151,000	149,917	120,625	107,000	-13,625
Total, Operations of Facilities	**896,000**	**892,270**	**830,790**	**824,000**	**-6,790**
Program Readiness	68,000	71,892	0	0	0
Material Recycle and Recovery	126,000	126,000	0	0	0
Containers	26,000	26,000	0	0	0
Storage	40,800	40,800	0	0	0
Safety and Environmental Operations	0	0	107,701	110,000	+2,299
Maintenance and Repair of Facilities	227,000	227,000	277,000	294,000	+17,000
Recapitalization					
Recapitalization	224,600	224,600	0	0	0
Infrastructure and Safety	0	0	253,724	554,643	+300,919
Capability Based Investments	0	0	98,800	112,639	+13,839
Subtotal, Recapitalization	**224,600**	**224,600**	**352,524**	**667,282**	**+314,758**
Total, Operating	**1,608,400**	**1,608,562**	**1,568,015**	**1,895,282**	**+327,267**
Construction	425,000	425,000	711,109	826,670	+115,561
Total, Infrastructure and Operations (formerly RTBF)	**2,033,400**	**2,033,562**	**2,279,124**	**2,721,952**	**+442,828**

(Dollars in Thousands)

	FY 2015 Enacted	FY 2015 Current	FY 2016 Enacted	FY 2017 Request	FY 2017 vs FY 2016
Secure Transportation Asset (STA)					
Operations and Equipment	121,882	122,806	140,000	179,132	39,132
Program Direction - Albuquerque	97,118	97,118	97,118	103,600	+6,482
Total, Secure Transportation Asset	**219,000**	**219,924**	**237,118**	**282,732**	**+45,614**
Nuclear Counterterrorism Incident Response	**177,940**	**178,190**	**0**	**0**	**0**
Counterterrorism and Counterproliferation Programs	**46,093**	**46,093**	**0**	**0**	**0**
Site Stewardship	**76,531**	**76,531**	**0**	**0**	**0**
Defense Nuclear Security					
Operations and Maintenance	636,123	636,123	639,891	657,133	+17,242
Security Improvements Program	0	0	30,000	0	-30,000
Construction	0	0	13,000	13,000	0
Total, Defense Nuclear Security	**636,123**	**636,123**	**682,891**	**670,133**	**-12,758**
Information Technology and Cybersecurity	**179,646**	**179,646**	**157,588**	**176,592**	**+19,004**
Legacy Contractor Pensions	**307,058**	**307,058**	**283,887**	**248,492**	**-35,395**
Domestic Uranium Enrichment (DUE) Research, Development and Demonstration	**97,200**	**97,200**	**0**	**0**	**0**
Subtotal, Weapons Activities	**8,231,770**	**8,250,249**	**8,846,948**	**9,285,147**	**+438,199**
Use of Prior Year Balances	**0**	**-18,229**	**0**	**0**	**0**
Rescission of Prior Year Balances	**-51,411**	**-51,411**	**0**	**-42,000**	**-42,000**
Total, Weapons Activities	**8,180,359**	**8,180,609**	**8,846,948**	**9,243,147**	**+396,199**

Outyears for Weapons Activities
Funding by Congressional Control

(Dollars in Thousands)

	FY 2018 Request	FY 2019 Request	FY 2020 Request	FY 2021 Request
Directed Stockpile Work				
Life Extension Programs and Major Alterations				
B61 Life Extension Program	727,572	727,184	754,611	699,663
W76 Life Extension Program	224,134	118,414	28,115	0
W78/88-1 Life Extension Program	0	0	112,394	369,673
W88 Alt 370	255,292	247,546	245,791	213,757
Cruise Missile Warhead Life Extension Study	0	0	0	0
W80-4 Life Extension Program	399,090	462,243	497,563	636,190
Total, Life Extension Programs and Major Alterations	**1,606,088**	**1,555,387**	**1,638,474**	**1,919,283**
Stockpile Systems				
B61 Stockpile Systems	51,816	48,780	51,264	51,509
W76 Stockpile Systems	42,361	46,181	47,884	48,415
W78 Stockpile Systems	62,064	60,467	65,932	63,592
W80 Stockpile Systems	71,104	63,840	66,011	66,521
B83 Stockpile Systems	37,262	35,740	22,421	22,876
W87 Stockpile Systems	80,522	75,096	78,450	79,247
W88 Stockpile Systems	152,711	172,999	164,379	159,963
Total, Stockpile Systems	**497,840**	**503,103**	**496,341**	**492,123**
Weapons Dismantlement and Disposition	**71,553**	**73,446**	**73,789**	**75,406**
Stockpile Services				
Production Support	470,402	507,465	494,550	496,243
Research and Development Support	32,292	34,036	37,351	41,570
Research and Deveopment Certification and Safety	204,499	207,770	217,744	245,278
Managemement, Technology, and Production	272,080	314,547	316,388	317,960
Plutonium Sustainment	0	0	0	0
Tritium Readiness	0	0	0	0
Total, Stockpile Services	**979,273**	**1,063,818**	**1,066,033**	**1,101,051**
Strategic Materials				
Uranium Sustainment	20,579	24,302	29,297	30,258
Plutonium Sustainment	153,367	169,030	191,024	194,444
Tritium Sustainment	157,152	120,440	122,918	125,197
Domestic Uranium Enrichment	60,000	70,000	110,000	112,500
Strategic Materials Sustainment	206,196	202,391	210,754	217,981
Total, Strategic Materials	**597,294**	**586,163**	**663,993**	**680,380**
Total, Directed Stockpile Work	**3,752,048**	**3,781,917**	**3,938,630**	**4,268,243**

	(Dollars in Thousands)			
	FY 2018 Request	FY 2019 Request	FY 2020 Request	FY 2021 Request
Research, Development, Test and Evaluation (RDT&E)				
Science				
Advanced Certification	59,044	60,225	61,429	62,658
Primary Assessment Technologies	100,782	102,798	104,854	106,951
Dynamic Materials Properties	122,347	141,014	146,206	139,767
Advanced Radiography	77,155	77,817	78,520	58,537
Secondary Assessment Technologies	77,368	78,915	80,494	82,104
Academic Alliances and Partnerships	52,963	53,958	54,954	56,102
Total, Science	**489,659**	**514,727**	**526,457**	**506,119**
Engineering				
Enhanced Surety	44,412	45,757	44,072	44,241
Weapon Systems Engineering Assessment Technology	23,029	21,771	22,214	22,404
Nuclear Survivability	31,230	32,276	33,133	33,365
Enhanced Surveillance	45,147	46,226	47,186	47,376
Total, Engineering	**143,818**	**146,030**	**146,605**	**147,386**
Inertial Confinement Fusion Ignition and High Yield				
Ignition	79,575	83,350	86,421	86,421
Support of Other Stockpile Programs	23,565	23,565	27,765	27,765
Diagnostics, Cryogenics and Experimental Support	77,915	82,723	84,023	83,141
Pulsed Power Inertial Confinement Fusion	7,596	8,416	9,096	9,096
Joint Program in High Energy Density Laboratory Plasmas	9,492	9,492	9,492	9,492
Facility Operations and Target Production	346,791	349,347	352,840	352,840
Total, Inertial Confinement Fusion Ignition and High Yield	**544,934**	**556,893**	**569,637**	**568,755**
Advanced Simulation and Computing	**668,244**	**685,471**	**707,673**	**720,305**
Advanced Manufacturing Development				
Additive Manufacturing	12,000	12,000	12,000	12,000
Component Manufacturing Development	27,791	23,303	36,982	46,666
Process Technology Development	30,055	31,167	28,702	29,244
Advanced Manufacturing Development	**69,846**	**66,470**	**77,684**	**87,910**
Total, RDT&E	**1,916,501**	**1,969,591**	**2,028,056**	**2,030,475**

	(Dollars in Thousands)			
	FY 2018 Request	FY 2019 Request	FY 2020 Request	FY 2021 Request
Infrastructure and Operations (formerly RTBF)				
Operating				
Operations of Facilities				
Kansas City National Security Campus (formerly Kansas City Plant)	102,000	105,000	106,000	110,000
Lawrence Livermore National Laboratory	74,000	80,000	82,000	84,000
Los Alamos National Laboratory	189,000	196,000	200,000	205,000
Nevada National Security Site	95,000	94,000	97,000	99,000
Pantex	56,000	56,000	57,000	58,000
Sandia National Laboratories	118,000	122,000	126,000	129,000
Savannah River Site	83,000	89,000	92,000	95,000
Y-12 National Security Complex	104,000	105,000	103,000	104,000
Total, Operations of Facilities	**821,000**	**847,000**	**863,000**	**884,000**
Program Readiness	0	0	0	0
Recovery	0	0	0	0
Containers	0	0	0	0
Storage	0	0	0	0
Safety and Environmental Operations	113,000	111,000	114,000	115,000
Maintenance and Repair of Facilities	305,000	327,000	315,000	328,000
Recapitalization				
Recapitalization				
Infrastructure and Safety	334,982	339,590	353,340	374,709
Capability Based Investments	119,850	132,703	150,166	120,185
Subtotal, Recapitalization	454,832	472,293	503,506	494,894
Total, Operating	**1,693,832**	**1,757,293**	**1,795,506**	**1,821,894**
Construction	952,095	1,035,600	1,033,596	1,063,900
Total, Infrastructure and Operations (formerly RTBF)	**2,645,927**	**2,792,893**	**2,829,102**	**2,885,794**

	(Dollars in Thousands)			
	FY 2018 Request	FY 2019 Request	FY 2020 Request	FY 2021 Request
Secure Transportation Asset (STA)				
Operations and Equipment	222,964	244,409	226,882	215,207
Program Direction - Albuquerque	107,100	110,700	114,100	116,632
Total, Secure Transportation Asset	**330,064**	**355,109**	**340,982**	**331,839**
Nuclear Counterterrorism Incident Response	**0**	**0**	**0**	**0**
Counterterrorism and Counterproliferation Programs	**0**	**0**	**0**	**0**
Site Stewardship	**0**	**0**	**0**	**0**
Defense Nuclear Security				
Operations and Maintenance	680,977	692,081	704,944	721,942
Construction	0	0	0	0
Total, Defense Nuclear Security	**680,977**	**692,081**	**704,944**	**721,942**
Information Technology and Cybersecurity	**178,728**	**184,308**	**188,734**	**192,500**
Legacy Contractor Pensions	**157,060**	**87,404**	**87,404**	**87,404**
Domestic Uranium Enrichment (DUE) Research, Development and Demonstration	**0**	**0**	**0**	**0**
Subtotal, Weapons Activities	**9,661,305**	**9,863,303**	**10,117,852**	**10,518,197**
Use of Prior Year Balances	**0**	**0**	**0**	**0**
Rescission of Prior Year Balances	**0**	**0**	**0**	**0**
Total, Weapons Activities	**9,661,305**	**9,863,303**	**10,117,852**	**10,518,197**
Support of DOD Requirements	-1,271,913	-1,296,378	-1,324,240	-1,350,725

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 2015 Enacted	FY 2015 Current	FY 2016 Enacted	FY 2017 Request	FY 2017 vs FY 2016
Research and Development (R&D)					
Basic	3,677	3,677	0	0	0
Applied	3,738,777	3,738,777	3,338,779	4,572,967	+1,234,188
Development	803,084	803,084	586,547	677,617	+91,070
Subtotal, R&D	**4,545,538**	**4,545,538**	**3,925,326**	**5,250,584**	**+1,325,258**
Equipment	116,442	116,442	125,808	106,000	-19,808
Construction	0	0	0	0	0
Total, R&D	**4,661,980**	**4,661,980**	**4,051,134**	**5,356,584**	**+1,305,450**

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 without developing new weapon systems; (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 Department of Energy's (DOE) Strategic Plan Goal to Enhance 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 10, 2015 and described in the FY 2016 SSMP. The baseline plan was updated to execute this program, and includes modernization through life extension of the Nation's stockpile that implements the 3+2 Strategy (the strategy transitions the stockpile to three interoperable ballistic missile warheads deployed on both the Submarine Launched Ballistic Missile (SLBM) and the Intercontinental Ballistic Missile (ICBM) legs of the triad and on two air-delivered warheads or bombs). In order to fund investments to arrest the growth in deferred maintenance of critical facilities, to address aging infrastructure, and to transform the information technology and cyber security environments, some reductions within DSW were necessary. The Budget Request was prioritized to meet LEP First Production Unit (FPU) schedules in accordance with the 3+2 Strategy and to accelerate dismantlement of retired weapons by 20%.

DSW executes the program pursuant to the direction given in the President's Nuclear Weapon Stockpile Plan (NWSP). 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) enhances technologies for multi-system applications (e.g., neutron generators (NGs), gas transfer systems (GTSs), power sources, detonators, initiation systems, and Arming Fuzing & Firing (AF&F) systems) to reduce life cycle costs while leveraging near-term and long-term stockpile development needs; (11) enhances NNSA transportation safety and security by implementing new weapon shipping configurations; (12) sustains the nuclear materials 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.

The DSW Budget Request for FY 2017 is $3,330,527,000. This represents a 1.7% or $57,265,000 decrease below the FY 2016 Enacted appropriation. Within DSW, the Budget Request for LEP's increased by $37,809,000 due to the expanded work scope for the W88 Alt 370 including conventional high explosives refresh (CHE) activities, the ramp up of work on the W80-4, and to increase staffing requirements for the Product Realization Teams at laboratories and production facilities across the nuclear security enterprise. The request for Stockpile Systems decreased by $38,750,000 due to the completion of some maintenance activities, and to support higher priority investments in other areas outside of Stockpile Systems. This results in a reduction in the request for maintenance, surveillance and surety. The WDD increase of $16,984,000 supports the President's intent to accelerate dismantlement of retired U.S. nuclear warheads by 20 percent. The request for Stockpile Services decreased by $38,891,000 with reductions in early technology development, advanced engineering

efforts, and multi-system surveillance activities. Strategic Materials decreased by $34,417,000 moving the conceptual planning and design of some projects to the Capabilities Based Investments (CBI) line, and deferring the reestablishment of a purified depleted uranium supply until evaluation of existing supplies and future demand is completed.

Highlights of the FY 2017 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 80% of W76-1 cumulative production unit builds and achieve B61-12 First System Qualification Flight Test.
- Transition the W88 Alt 370 activities from Phase 6.3 (Development Engineering) to Phase 6.4 in accordance with the integrated schedule to meet an FY 2020 FPU.
- Continue Phase 6.2 (Feasibility Study and Design Options) 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 limited life component (LLCs) for the B61, W76, W78, W80, B83, W87, and W88. LLCs include gas transfer systems (GTSs), neutron generators (NGs), and alteration kits delivered to the Department of Defense (DOD) and the Pantex Plant to sustain the nuclear weapons stockpile.
- Conduct revised 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 which includes the in-depth testing and analysis of their 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.
- Complete development studies and/or capability improvements.

Weapons Dismantlement and Disposition

- Support NNSA's goal of eliminating weapons retired prior to 2009 by 2021.

Stockpile Services

- Provide the foundation for capabilities and capacity within the nuclear security enterprise necessary to sustain DSW activities.
- Complete Annual Assessment Cycle for the stockpile, deliver the Laboratory Director Letters to the President, and provide Weapons Reliability Reports to DOD.
- Continue the surety multi-application product development at a reduced level.
- Support multiple-system technology development and exploratory studies to address current and emerging stockpile issues, as well as develop replacement LLCs due to sunset technologies
- Operate and maintain the Joint Integrated Lifecycle Surety (JILS) tool to evaluate potential surety improvements to the nuclear security enterprise.
- Continue the archiving of weapons data and upgrading of research and development (R&D) and engineering tools to remain current with evolving technologies.
- Continue supporting the Nuclear Testing Heritage program.

Strategic Materials

- Uranium Sustainment
  - Expand and accelerate 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.

- Tritium Sustainment
  - Complete irradiation of 704 TPBARs in the Watts Bar Unit 1 (WBN1) in Cycle 14 and commence irradiation of 1104 TPBARs for Cycle 15 in WBN1.
  - Continue preparing a second reactor for tritium production, and conduct two extractions at the Tritium Extraction Facility (TEF) to prepare for increased production.
- Domestic Uranium Enrichment (DUE)
  - Preserve and advance uranium enrichment expertise and technology to meet current and future U.S. government needs.
- 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.
  - Provide for receipt, storage, inventory and management of pits, highly enriched uranium (HEU), and other weapon nuclear and non-nuclear materials.

Major Outyear Priorities and Assumptions

Outyear funding levels for DSW total $15,740,838,000 for FY 2018 through FY 2021. DSW priorities include the following:

Life Extension Programs and Major Alterations

- Execute the W76-1 LEP, B61-12 LEP and W80-4 LEP scheduled deliverables.
- Execute W88 Alt 370 including CHE Refresh activities.
- Re-start the W78/88-1 LEP activities in FY 2020.

Stockpile Systems

- Complete development, qualification, production, and delivery of all scheduled LLCs for the active stockpile.
- Conduct surveillance programs for all weapon systems using data collection from flight tests, laboratory tests, and component evaluations to assess stockpile reliability without nuclear testing. Continue to analyze, evaluate, and close high priority SFIs in accordance with the currently approved baseline closure plans.
- Conduct assessment activities for all legacy weapons which includes the in-depth testing and analysis at system and component levels required for the Annual Assessment process and significant finding investigations.
- Continue ISA implementation to the surety configurations for the W88 Stockpile System.

Weapons Dismantlement and Disposition

- Maintain progress towards the NNSA goal of eliminating weapons retired prior to 2009 by 2021.

Stockpile Services

- Continue to provide the foundation for capabilities and capacity within the nuclear security enterprise necessary to sustain DSW activities.
- Continue ongoing activities that directly support the internal design laboratory site-specific R&D activities. This includes management activities that support stockpile studies and programmatic work for multiple systems or non-weapon specific systems.
- Continue ongoing activities that support the stockpile by designing and developing LLCs not directly attributable to a specific warhead, such as NGs, GTSs, and other components, and surety development.
- Continue to perform hydrodynamic test and subcritical experiments that support the stockpile and LEPs.
- Continue to support the Annual Assessment process and deliver the Laboratory Director Letters to the President.
- Continue to analyze, evaluate, and close high priority SFIs in accordance with the currently approved baseline closure plans.
- Continue to provide Weapons Reliability Reports to DOD.

- Continue assessing and prioritizing needed technologies to maintain base capabilities of the enduring stockpile weapons.
- Implement surety interface compatibility retrofit technologies for the NNSA Safeguards Transporter Fleet.

Strategic Materials

- Uranium Sustainment - Continue reducing safety and security risks through the Y-12 Area 5 de-inventory efforts by further accelerating the movement of weapon assemblies and materials to the Highly Enriched Uranium Materials Facility, performing additional safety analysis and material characterization in support of material disposition, and re-engineering process flows to stop the flow of material into Building 9212.
- Uranium Sustainment – Support additional efforts to develop, sustain, and increase the reliability of uranium scientific and manufacturing capabilities.
- Plutonium Sustainment – Continue to invest in manufacturing equipment (acquire, install, configure and authorize for operation) to replace an aging base capability for pits while progressing towards the development, qualification, and certification of W87 pit manufacturing processes.
- Tritium Sustainment – Continue to provide an assured supply of tritium to meet national defense needs and increase production capacity necessary to meet national security requirements.
- DUE – Continue to support the provision of enriched uranium without peaceful use restrictions in order to support the tritium production mission as well as varying uranium assays and forms to maintain the nuclear weapons stockpile.
- Strategic Materials Sustainment- Continue to support mission deliverables through the recycle of weapons-related materials (including funding for operations and management of enduring uranium processing facilities); continue de-inventory of the Los Alamos National Laboratory's (LANL) Chemistry and Metallurgy Research (CMR) and PF-4 vault facilities, and continue to evaluate options for providing high purity depleted uranium (DU). Continue to provide the base capability and capacity across production plants and national laboratories for storage of plutonium, uranium, lithium, tritium and other materials consistent with the SSMP and Production and Planning Directive (P&PD). Also, complete processing of SNL sodium bonded fuel experiment assemblies and decommissioning of specialized project equipment by FY 2021.

FY 2015 Accomplishments

Life Extension Programs and Major Alterations

- B61-12 LEP successfully completed implementation of an Electronic Industries Alliance (EIA) compliant Earned Value Management System to improve scope, cost and schedule management and completed over 40 component level baseline design reviews (BDRs) to support a System BDR in FY 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 conducted the first two full system drop tests from an F-15E including the first System II (digital) test integrating the USAF Tail Kit Assembly. The third full system drop tests from an F-15E was successfully completed in October 2015 (FY 2016).
- B61-12 LEP successfully conducted the first LEP configured hydrodynamic test to support Los Alamos National Laboratory's nuclear certification.
- B61-12 LEP compiled a program protection plan (PPP) and began executing nuclear enterprise assurance activities.
- Completed the FY2015 scheduled deliveries for the W76-1 LEP to the Department of the Navy.
- Continued W88 Alt 370 design and fabrication of prototype functional hardware at component, sub-assembly, and AF&F level for qualification testing.
- Successfully completed 12 component Baseline Design Reviews (BDRs) for the W88 Alt 370.
- Modified the W88 Alt 370 program to include the additional scope associated with CHE Refresh.
- Successfully completed the Follow-on Commanders Evaluation Test (FCET)-51 W88 Alt 370 development flight test.
- Completed Phase 6.1 (Concept Assessment) activities for the W80-4 (cruise missile warhead) LEP and obtained NWC approval to begin Phase 6.2.

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 the new B61 Joint Test Assembly (JTA) configuration via successful conduct of the JTA Modernization project.
- Completed Alt 353 (gas transfer system) close-out activities for the B83 and initiated the life storage program.
- Completed JTA Sustainment close-out activities for the B83.
- Met DOD requirements for W87 Small Ferroelectric Neutron Generator retrofits.
- Successfully executed the first extended range flight tests carrying W78 and W87 instrumented JTAs.

Weapons Dismantlement and Disposition

- Continued to make progress on NNSA's goal to dismantle weapons retired prior to FY 2009 by the end of FY 2022. Developed plans to accelerate weapon dismantlements so this goal could be accomplished one year sooner. Exceeded planned CSA dismantlements at Y12.
- Supported the Navy's request to return W76-0 warheads early, avoiding several million dollars in future staging costs.

Stockpile Services

- 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 Alt 370, 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 10 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 the W88 legacy and Alt 370 qualification effort.
- Archived past weapons data and converted sunset technology files to state-of-the-art data storage/security systems.
- 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.
- Submitted Weapons Reliability Reports to DOD.
- Provided direct support to Stockpile Systems for flight tests and development for new high explosives (HE) for flight test diagnostics and qualification activities.
- Achieved Technology Readiness Levels (TRL) 5 on ISA base capability development for W88 Alt 940.
- Executed the W88 ALT 370/940 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.

Strategic Materials

- Completed the Confinement Vessel Disposition milestone at LANL (2 of 3 confinement vessels processed); and completed the High Efficiency Neutron Counter (HENC-3) project to establish a WIPP compatible TRU-waste monitoring and characterization capability at TA-55.
- Completed irradiation of 704 TPBARs in Cycle 13 in WBN1 reactor.
- Completed extraction of 241 TPBARs at the Tritium Extraction Facility (TEF).
- Completed a reactor safety analysis and submitted a license amendment request to the Nuclear Regulatory Commission (NRC) to increase TPBAR production up to 1,792 TPBARs in the WBN1 reactor.
- Completed the recycle and recovery of tritium ahead of schedule in support of DSW requirements.
- Exceeded the Area 5 de-inventory goal by ~4 metric tons (12.3 metric tons removed); and completed the installation of direct canning station in Beta 2E.

Directed Stockpile Work
Funding

(Dollars in Thousands)

	FY 2015 Enacted	FY 2015 Current	FY 2016 Enacted	FY 2017 Request	FY 2017 vs FY 2016
Directed Stockpile Work					
Life Extension Programs and Major Alterations					
B61 Life Extension Program	643,000	644,420	643,300	616,079	-27,221
W76 Life Extension Program	259,168	234,168	244,019	222,880	-21,139
W78/88-1 Life Extension Program	0	0	0	0	0
W88 Alt 370	165,400	204,400	220,176	281,129	+60,953
Cruise Missile Warhead Life Extension Study	9,418	10,360	0	0	0
W80-4 Life Extension Program	0	0	195,037	220,253	+25,216
Total, Life Extension Programs and Major Alterations	**1,076,986**	**1,093,348**	**1,302,532**	**1,340,341**	**+37,809**
Stockpile Systems					
B61 Stockpile Systems	109,615	114,615	52,247	57,313	+5,066
W76 Stockpile Systems	45,728	41,564	50,921	38,604	-12,317
W78 Stockpile Systems	62,703	59,833	64,092	56,413	-7,679
W80 Stockpile Systems	70,610	75,610	68,005	64,631	-3,374
B83 Stockpile Systems	63,136	63,136	42,177	41,659	-518
W87 Stockpile Systems	91,255	89,005	89,299	81,982	-7,317
W88 Stockpile Systems	88,060	86,625	115,685	103,074	-12,611
Total, Stockpile Systems	**531,107**	**530,388**	**482,426**	**443,676**	**-38,750**
Weapons Dismantlement and Disposition	**50,000**	**50,000**	**52,000**	**68,984**	**+16,984**
Stockpile Services					
Production Support	350,942	352,442	447,527	457,043	+9,516
Research and Development Support	25,500	25,500	41,059	34,187	-6,872
Research and Deveopment Certification and Safety	160,000	160,000	185,000	156,481	-28,519
Managemement, Technology, and Production	226,000	226,000	264,994	251,978	-13,016
Plutonium Sustainment	132,000	132,000	0	0	0
Tritium Readiness	140,053	140,053	0	0	0
Total, Stockpile Services	**1,034,495**	**1,035,995**	**938,580**	**899,689**	**-38,891**
Strategic Materials					
Uranium Sustainment	0	0	32,916	20,988	-11,928
Plutonium Sustainment	0	0	174,698	184,970	+10,272
Tritium Sustainment	0	0	104,600	109,787	+5,187
Domestic Uranium Enrichment	0	0	50,000	50,000	0
Strategic Materials Sustainment	0	0	250,040	212,092	-37,948
Total, Strategic Materials	**0**	**0**	**612,254**	**577,837**	**-34,417**
Total, Directed Stockpile Work	**2,692,588**	**2,709,731**	**3,387,792**	**3,330,527**	**-57,265**

Outyears for Directed Stockpile Work
Funding

(Dollars in Thousands)

	FY 2018 Request	FY 2019 Request	FY 2020 Request	FY 2021 Request
Directed Stockpile Work				
Life Extension Programs and Major Alterations				
B61 Life Extension Program	727,572	727,184	754,611	699,663
W76 Life Extension Program	224,134	118,414	28,115	0
W78/88-1 Life Extension Program	0	0	112,394	369,673
W88 Alt 370	255,292	247,546	245,791	213,757
Cruise Missile Warhead Life Extension Study	0	0	0	0
W80-4 Life Extension Program	399,090	462,243	497,563	636,190
Total, Life Extension Programs and Major Alterations	**1,606,088**	**1,555,387**	**1,638,474**	**1,919,283**
Stockpile Systems				
B61 Stockpile Systems	51,816	48,780	51,264	51,509
W76 Stockpile Systems	42,361	46,181	47,884	48,415
W78 Stockpile Systems	62,064	60,467	65,932	63,592
W80 Stockpile Systems	71,104	63,840	66,011	66,521
B83 Stockpile Systems	37,262	35,740	22,421	22,876
W87 Stockpile Systems	80,522	75,096	78,450	79,247
W88 Stockpile Systems	152,711	172,999	164,379	159,963
Total, Stockpile Systems	**497,840**	**503,103**	**496,341**	**492,123**
Weapons Dismantlement and Disposition	**71,553**	**73,446**	**73,789**	**75,406**
Stockpile Services				
Production Support	470,402	507,465	494,550	496,243
Research and Development Support	32,292	34,036	37,351	41,570
Research and Deveopment Certification and Safety	204,499	207,770	217,744	245,278
Managemement, Technology, and Production	272,080	314,547	316,388	317,960
Plutonium Sustainment	0	0	0	0
Tritium Readiness	0	0	0	0
Total, Stockpile Services	**979,273**	**1,063,818**	**1,066,033**	**1,101,051**
Strategic Materials				
Uranium Sustainment	20,579	24,302	29,297	30,258
Plutonium Sustainment	153,367	169,030	191,024	194,444
Tritium Sustainment	157,152	120,440	122,918	125,197
Domestic Uranium Enrichment	60,000	70,000	110,000	112,500
Strategic Materials Sustainment	206,196	202,391	210,754	217,981
Total, Strategic Materials	**597,294**	**586,163**	**663,993**	**680,380**
Total, Directed Stockpile Work	**3,752,048**	**3,781,917**	**3,938,630**	**4,268,243**

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

	FY 2017 vs FY 2016 Request
Directed Stockpile Work	
Life Extension Programs and Major Alterations. Provides for an increase of for the W88 Alt 370 to support CHE Refresh activities, and an increase for the W80-4 LEP for staffing of the Product Realization Teams at the laboratories and production facilities across the nuclear security enterprise in order to facilitate adequate planning, scheduling, and cost-estimating for the program. The increases are partially offset by a decrease for the B61-12 LEP reflecting completion of the baseline design in FY 2016 and the W76-1 LEP as they move into the final years of production.	**+37,809**
Stockpile Systems. Reflects completion of some maintenance activities, and planned reductions in surveillance, assessment, and surety.	**-38,750**
Weapons Dismantlement and Disposition. Supports the acceleration of the dismantlement of retired U.S. nuclear warheads by 20 percent.	**+16,984**
Stockpile Services. The decrease is due to reduced technology development efforts and multi-system activities supporting assembly/disassembly operations, assessment & studies, and multi-weapon management support partially offset by an increase in Production Support for the manufacturing modernization program and maintenance of critical skills at NNSA plants and labs.	**-$38,891**
Strategic Materials. The decrease is due to (1) rebalancing resources to more efficiently execute the enriched uranium strategy in support of ceasing enriched uranium programmatic operations in Building 9212 by 2025 at the Y-12 National Security Complex; (2) deferral of the reestablishment of a purified depleted uranium supply until evaluation of existing supplies and future demands is completed; and (3) changes in pension strategy. The decreases are partially offset by increases for the ramp-up of pit production, as well as conceptual planning and design activities for the Plutonium Modular Approach; fabrication of TPBARs and procurement of TPBAR components; and lithium direct material manufacturing at Y-12.	**-$34,417**
Total, Directed Stockpile Work	**-57,265**

Directed Stockpile Work
Life Extension Programs and Major Alterations

Description

Life Extension Programs (LEPs) and Major Alterations 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 DOE Procedural Guidelines for the Phase 6.X Process.

B61-12 Life Extension Program

On February 27, 2012, the NWC authorized Phase 6.3 for the B61-12 LEP. This 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 consistent with the 2010 Nuclear Posture Review Report objectives. 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 SLBM force.

W78/88-1 Life Extension Program

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 2017.

W88 Alt 370

On October 9, 2012, the NWC authorized Phase 6.3 for the W88 Alt 370. This Alt 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. Based on information provided by LANL in FY 2014, the NWC decided to replace the CHE (CHE Refresh) on the W88-0. CHE Refresh will leverage W88 Alt 370 tests to the maximum extent possible to minimize costs, reduce the logistical impact on the Navy, and make the FPU coincide with the Alt 370. Compared with the funding level increase for the CHE refresh in the FY 2016 budget submission, higher levels in the 2017 budget reflect reassessment of the cost of this initiative. 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. Lawrence Livermore National Laboratory (LLNL) and SNL, respectively, are the nuclear and non-nuclear design agencies for this LEP. 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 for other designs (e.g., the B61-12 and W88 Alt 370); exploring options for enhanced surety; complying with the 2010 Nuclear Posture Review (NPR) Report and parallel development with the Air Force on Warhead/Missile interface. The Request supports an FPU in 2025 as approved by the Nuclear Weapons Council.

FY 2018 - FY 2021 Key Milestones

B61-12 Life Extension Program

- **System Engineering & Integration**: Phase 6.4 activities at the system-level will continue in FY 2018. The final design review, independent peer reviews, and system final design release are scheduled for completion in FY 2018. Pantex Plant production readiness activities will continue to support a Nuclear Explosives Safety Study and Readiness Reviews in FY 2019 to authorize B61-12 assembly and disassembly operations. Joint qualification activities will continue into FY 2019 to enable release of system qualification and associated aircraft compatibility documents. Phase 6.5 will occur in FY 2019 following the completion of production readiness review and the Pre Pilot Production Gate Review. FPU will occur in FY 2020.
- **Component Development & Production**: Phase 6.4 activities will continue in FY 2018 at NNSA nuclear weapons production facilities to assure all production hardware meets war reserve quality requirements. Process Prove-in (PPI) and Qualification Evaluation (QE) activities will continue through FY 2019 for all major components and assemblies, including new firing, arming and safing components, radar and weapon controller, NEP components, system II interface, LLCs, power supplies, thermal batteries, and use control components. All component qualifications will be completed in FY 2019 and all war reserve hardware will be required to be shipped to Pantex to support the FPU.
- **System Testing & Qualification**: Testing will continue in FY 2018 through FY 2020 utilizing B61-12 LEP production representative functional hardware produced at NNSA production plants. System qualification testing, including both joint flight tests with the Air Force tail kit assembly (TKA) and ground test against normal and abnormal environments, will continue through FY 2020. NNSA and the Air Force will conduct aircraft compatibility testing to certify the B61-12 LEP nuclear bomb on required aircraft platforms. Laboratories will continue modeling, simulations and analysis of test data to support system qualification in FY 2020. A system qualification report will be published documenting the qualification of the B61-12 LEP nuclear bomb in preparation for the FPU. The final Design Review and Acceptance Group (DRAAG) review is scheduled for FY 2020.

W76-1 Life Extension Program

- Meet production and delivery schedules.
- Continue efforts to improve the manufacturability of the components and reduce costs.
- Continue Retrofit Evaluation System Testing for War Reserve production.
- Perform an Annual Assessment of W76-1 warheads.
- Production complete in FY 2019.

W88 Alt 370 Program

- **System Engineering & Integration.** Phase 6.4 activities at the system-level will begin in FY 2017. PPI activities will continue through FY 2018. The final design review, independent peer reviews, and system final design release will be completed in FY 2018. Phase 6.6 will begin in FY 2020, following completion of a production readiness review and the Pre Pilot Production Gate Reviews in FY 2019. FPU is scheduled for FY 2020.
- **Component Development & Production.** PPI and QE activities will continue through FY 2018 for all major components and assemblies, including new AF&F system, lightning arrestor connector, and NEP component development work associated with CHE Refresh. All component qualifications will be complete in FY 2018, and war reserve hardware will begin shipping to Pantex in FY 2019.

- **System Testing & Qualification**. Joint ground and flight testing, including normal and abnormal environments testing, and implementation of CHE Refresh will be conducted through FY 2018 in coordination with the Navy. NNSA nuclear security laboratories will continue modeling, simulations, and analysis of test data to support system qualification in FY 2018. A system qualification report documenting the W88 Alt 370 weapon system will be published in FY 2020. The final DRAAG review will occur in FY 2020, followed by release of the final weapon development report in FY 2021.

W80-4 Life Extension Program

- With NWC authorization, Phase 6.2 commenced in the fourth quarter of FY 2015, and will continue into FY 2018. Phase 6.2 will include the formation of system and component product realization teams, identification and development of design options, and the comparison of design and manufacturability tradeoffs and life-cycle advantages and disadvantages. Phase 6.2 will conclude with a written Phase 6.2 report, identifying preferred design options and a brief to the NWC Standing and Safety Committee.
- Phase 6.2A is planned to start in FY 2018 to perform a detailed cost study of selected design options, identify production issues, and develop workload and process development plans to accomplish the LEP production. Phase 6.2A will include the development of technical and programmatic documents for developing a program baseline early in Phase 6.3. At the conclusion of Phase 6.2A, the Weapon Design and Cost Report, along with estimated DOD costs, will be presented to the NWC with a final warhead option down-select and a recommendation on proceeding to Phase 6.3.
- Phase 6.3 is scheduled to begin in FY 2019 by developing the Baseline Cost Report and Selected Acquisition Report; complete a detailed design that is demonstrated to be feasible with regard to critical safety, performance, and production considerations; produce the final-draft version of the Military Characteristics and Stockpile-to-Target Sequence; and produce a draft addendum to the Final Weapon Development Report for review by the DRAAG.

Activities and Explanation of Changes

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs FY 2016
B61-12 Life Extension Program $643,300,000	**B61-12 Life Extension Program $616,079,000**	**B61-12 Life Extension Program -$27,221,000**
• **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 will be used for System Baseline Design Reviews scheduled in FY 2016. Following completion of these reviews, NNSA will authorize Phase 6.4. Continue system design and integration of nuclear bomb components and the Air Force tail kit assembly to validate 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 utilizing final development hardware produced	• **System Engineering & Integration:** FY 2017 will be the first full year of Phase 6.4 after the completion of the system baseline design review and the completion of the Air Force Preliminary Design Review and Acceptance Group (PDRAAG) in FY 2016. System design and integration of nuclear bomb components and the Air Force tail kit assembly will continue toward validating the final design in FY 2018, 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 and continue SS-21 production readiness activities at Pantex Plant. • **Component Development & Production**: Phase 6.4 activities will continue for all major components in FY 2017. Production Plants will continue procurement of tooling, testers and materials and will continue producing production representative hardware to validate and qualify production processes. All components will be executing or completing PPI in FY 2017, 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 LANL will lead and conduct 5 system-level physics tests. Joint tests will begin gathering data to qualify the B61-12 utilizing	• The decrease reflects the completion of baseline design in FY 2016, as well as a decrease resulting from a change in pension strategy. This is offset by an increase in production facility Phase 6.4 activities in preparation for production in FY 2018 and FY 2019. In addition, nuclear weapons production facilities will continue purchases of long-lead, commercial, off-the-shelf parts, equipment, tooling, and testers for use in War Reserve production; fully executing component PPI activities; and begin component QE activities.

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs FY 2016
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.	production representative functional hardware produced in FY 2015 through FY 2017. 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. Continue aircraft compatibility to assess integration with required aircraft platforms including conducting the first system qualification drop test. LANL and SNL will 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 $222,880,000**	**W76-1 Life Extension Program -$21,139,000**
• Perform Annual Assessment for the W76-1 LEP. Complete disassembly of W76-0 for the W76-1 LEP feedstock. • 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. Produce REST unique hardware required for testing. Continue production of surveillance replacement components destructively tested; rebuild 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 at Kansas City National Security Campus. Perform purchases of vendor materials to meet the current deliverables in agreement with the Department of the Navy and	• Perform the Annual Assessment for the W76-1 LEP. • Complete REST of W76-1 LEP production components and war reserve hardware. Produce REST unique hardware required for testing. • Complete production of surveillance replacement components destructively tested; rebuild war reserve after REST and stockpile surveillance through the life of the program. • 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 in support of submarine deployment requirements. 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,	• The decrease is due to completion of disassemblies for LEPs and the transition from REST surveillance on the W76-1 LEP to W76 systems stockpile surveillance, and a change in pension strategy. • Planned deliverables can still be executed with managed program risk.

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs FY 2016
in support of submarine deployment requirements. • Continue executing production builds at the approved rate and realign the production of surveillance replacement components with the production schedule, including 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.	telemetries, and miscellaneous parts) aligned with the production schedule.	
W78/W88-1 Life Extension Program $0	**W78/W88-1 Life Extension Program $0**	**W78/W88-1 Life Extension Program $0**
• No program activities are scheduled in FY 2016. Phase 6.2 will resume in FY 2020.	• No program activities are scheduled in FY 2017. Phase 6.2 will resume in FY 2020.	• N/A
W88 Alt 370 $220,176,000	**W88 Alt 370 $281,129,000**	**W88 Alt 370 +$60,953,000**
• **System Engineering & Integration:** The majority of Phase 6.3 activities will conclude in FY 2016. The Preliminary Design Review and Acceptance Group (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:** Major components and assemblies including the new AF&F Assembly, stronglinks, radar, firing subsystem, thermal batteries, impact fuze, launch accelerometer, lightning arrestor connector, and joint flight test assemblies will complete baseline design reviews and transition to pre-production. CHE Refresh components will complete design and development, and will also transition to support the overall W88 Alt 370 FPU.	• **System Engineering & Integration:** Phase 6.4 activities to begin to mature production processes in preparation for production qualification and eventual war reserve production. Design Agencies will generate final system-level production specifications for the Re-Entry Body and JTAs. Production authorization activities will continue to support production readiness and Nuclear Explosive Safety Studies (NESS). • **Component Development & Production:** Final component qualification activities will be conducted leading to Final Design Reviews for all major components and assemblies, including new AF&F Assembly. The production agencies 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	• The increase funds CHE Refresh (the W88 Alt 370 and CHE Refresh activities formally baseline with the completion of the Baseline Cost Report and initiation of Phase 6.4), an increase for system engineering and integration efforts, component development and production, and system qualification activities to integrate CHE Refresh into the W88 alt 370 Program, offset by a decrease resulting from a change in pension strategy.

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs FY 2016
• **System Testing & Qualification:** Phase 6.3 activities continue with additional tests to integrate CHE Refresh. The System Baseline Design Review will be completed, which includes integration and qualification of the CHE Refresh. The Navy and NNSA will complete a flight test of a JTA body 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 Alt 370 with the Trident II D5 missile system. NNSA's design laboratories will planned modeling and simulations and analysis of tests.	qualification activities for the CHE Refresh portion of the program will also continue. • **System Testing & Qualification:** Although Phase 6.4 production engineering activities begin in FY 2017, there are final activities under Phase 6.3 continue including the addition of tests to integrate CHE Refresh. NNSA will support the flight test program including testing a JTA on the Follow-on Commander Evaluation Test (FCET)-53 missile. The design agencies will continue modeling and simulations of the final system design that will be validated in ground tests as part of the overall system validation and certification.	
W80-4 Life Extension Program $195,037,000	**W80-4 Life Extension Program $220,253,000**	**W80-4 Life Extension Program +$25,216,000**
• 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 programs. However, the additional funding was not received until December 2015 delaying the planned technology maturation activities in	• LLNL's number of Hydrodynamic tests will increase. • Implementation of enhanced surety and extended service life. 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. Technology Readiness Levels mature to TRL 3 or 4.	• The increase will support growth in staffing for the Product Realization Teams at laboratories and production facilities across the nuclear security enterprise in order to facilitate adequate planning, scheduling, and cost estimating for the program, offset by a decrease resulting from a change in pension strategy. • The funding also supports increased staffing for engineering development activities in preparation for FY 2018 full-scale Phase 6.3 Design Definition and Development Engineering 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.

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs FY 2016
Phase 6.2, but will not change the planned FPU date of FY 2025 to support of the Air Force Long-Range Standoff (LRSO) program. • 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.		

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 an underground nuclear test is required. Sustainment activities for each weapon system are identified by four major subprograms that support the enduring stockpile system, as well as LEPs and Major Program Alterations:

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-52 and B-2 bombers	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-52 and B-2 bombers	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 weapons	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/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 tests, new material flight tests, retrofit evaluation system laboratory and flight tests, stockpile laboratory tests, stockpile flight tests, quality evaluations, special testing, component and material evaluation, and surveillance of weapon systems to support assessment of the safety, security, and effectiveness of the nuclear weapons stockpile that contribute to the Annual Assessment and memorandum to the President.

(3) Weapon Assessment and Support: includes activities associated with management of the fielded weapon system. Provide systems and component engineering support, support to planning, resolution, and documentation of

Significant Finding Investigations (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 Report and activities needed to assess/resolve system-specific weapon response issues and to provide support to the Nuclear Explosive Safety (NES) and the Nuclear Weapon Safety Study Groups (NWSSG) as required.

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

Stockpile Systems Description

B61 Stockpile Systems

The B61 aircraft delivered gravity bombs are the oldest weapons in the enduring stockpile. 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 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 is a warhead 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.

FY 2018-FY 2021 Key Milestones

B61 Stockpile Systems

- **Weapon Maintenance:** Continue to produce LLCs and continue development and qualification activities for the new electronic neutron generator (ELNG) for B61-11 to achieve FPU in FY 2019.
- **Weapon Surveillance:** Continue surveillance activities at a reduced level to include but not limited to: disassembly and inspections (D&I), 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 AARs, which include: laboratory testing and analysis, and SFIs as required.
- **Development Studies/Capability Improvements:** Continue feasibility studies as required and development of the ELNG to achieve FPU in FY2019.

W76 Stockpile Systems

- **Weapon Maintenance:** Conduct maintenance activities in accordance with directive documents (PCD).

- **Weapon Surveillance:** Conduct surveillance activities for the W76-0 and W76-1 in accordance with directive documents. Continue to conduct W76-0 and W76-1 stockpile surveillance to include: D&I, system-level laboratory and joint flight testing, component and material evaluations (CME), and platform compatibility and testing activities.
- **Weapon Assessment and Support:** Continue to conduct weapon assessment activities necessary to complete Weapon Reliability and AARs 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. W76 development studies and capabilities will be focused toward the on-going LEP. Conduct activities for surety enhancements.

W78 Stockpile Systems
- **Weapon Maintenance:** Conduct maintenance activities in accordance with directive documents 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&Is, system-level laboratory tests, joint flight testing, component and material evaluations, and assessment. Obtain funding for full-scale engineering and development of a new Instrumented JTA for the W78 within Stockpile Systems.
- **Weapon Assessment and Support:** Continue weapon assessment activities necessary to complete Weapon Reliability and AARs to include: laboratory testing and analysis, SFIs as required, and completion of two Hydro Tests.
- **Development Studies/Capability Improvements:** Conduct feasibility studies as required and in conjunction with the DOD as necessary. Begin surety enhancement development activities in FY 2020.

W80 Stockpile Systems
- **Weapon Maintenance:** Continue production of LLCs and complete W80 NG qualification activities.
- **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 Weapon Reliability and AARs that include laboratory testing and analysis, and SFIs as required.
- **Development Studies/Capability Improvements:** Continue development activities for the Small Ferroelectric NG. Conduct feasibility studies as required and in conjunction with DOD as necessary.

B83 Stockpile Systems
- **Weapon Maintenance:** Continue to support reduced Limited Life Component Exchange (LLCE) operations for replacement of aging components as required.
- **Weapon Surveillance:** Continue surveillance activities at a reduced level to 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 Weapon Reliability and AARs, which include laboratory testing and analysis, and SFIs as required.
- **Development Studies/Capability Improvements:** No activities planned.

W87 Stockpile Systems
- **Weapon Maintenance:** Continue full-scale production of Small Ferroelectric NGs and retrofits at the Pantex Plant. Continue activities for replacement of GTS (Alt 360) with an FPU in FY 2019. Continue firing set development and qualification activities with a first production unit in FY 2019.
- **Weapon Surveillance:** Continue surveillance activities in accordance with directive documents, to include D&I, system-level laboratory and joint flight testing, component and material evaluations. In addition, Retrofit Evaluation System Tests for the W87 LLCE and Firing Set Rebuilds will continue.
- **Weapon Assessment and Support:** Continue weapon assessment activities necessary to complete Weapon Reliability and AARs to include laboratory testing and analysis, SFIs as required.
- **Development Studies/Capability Improvements:** Continue product realization activities for W87 Alt 360. Continue feasibility studies as required in conjunction with DOD.

W88 Stockpile Systems

- **Weapon Maintenance:** Achieve FPU build of new NG and re-manufacture of the GTS. Continue to execute production of replacement weapon components for surveillance, repair, maintenance, and replacement. Full-scale production of NG and GTS will begin in FY 2019.
- **Weapon Surveillance:** Continue surveillance activities to include: D&I, system-level laboratory and joint flight testing, component material evaluation, and platform compatibility and testing activities.
- **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.
- **Development Studies/Capability Improvements:** Continue critical development/integration and start system level qualification activities to replace legacy W88 System NG and GTS. Conduct appropriate feasibility studies in conjunction with DOD, and provide laboratory and management expertise to the POG and DOD Safety Studies. Conduct activities for surety enhancements, to include implementation of the surety technologies.

Activities and Explanation of Changes

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs FY 2016
B61 Stockpile Systems $52,247,000	**B61 Stockpile Systems $57,313,000**	**B61 Stockpile Systems +$5,066,000**
• **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, 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 Weapon Reliability and AARs, which include laboratory testing and analysis, and SFIs as required. • **Development Studies/Capability Improvements:** Continue design and development activities for the ELNG. Continue feasibility studies as required and in conjunction with 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, 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 Weapon Reliability and AARs, which include laboratory testing and analysis, and SFIs as required. • **Development Studies/Capability Improvements:** Continue design and development activities for the ELNG. Continue feasibility studies as required and in conjunction with DOD as necessary.	• Includes an increase for surveillance activities, and decreases for assessment activities and a change in pension strategy. These reductions will not restrict NNSA's ability to annually assess system performance and reliability.
W76 Stockpile Systems $50,921,000	**W76 Stockpile System $38,604,000**	**W76 Stockpile Systems -$12,317,000**
• **Weapon Maintenance:** Continue to produce LLCs. • **Weapon Surveillance:** Conduct W76-0 and W76-1 surveillance to include D&I, system-level laboratory and joint flight testing, increase in component testing at Y-12 and LANL, CME, and platform compatibility and testing activities. • **Weapon Assessment and Support:** Continue to conduct weapon assessment activities necessary to complete Weapon Reliability and AARs to include laboratory/site testing and analysis, trainer refurbishments, and SFIs.	• **Weapon Maintenance:** Continue producing LLCs. • **Weapon Surveillance:** Conduct W76-0 and W76-1 core surveillance activities to include D&I, system-level laboratory and joint flight testing, decrease in component testing, CME, and platform compatibility and testing activities. • **Weapon Assessment and Support:** Continue to conduct weapon assessment activities necessary to complete Weapon Reliability and AARs to include laboratory/site testing and analysis, trainer refurbishments, and SFIs.	• The decrease represents a reduction in W76-0 component testing, CME, and platform compatibility and testing activities, a decrease to rebalance between Stockpile Systems and Production Support primarily at CNS, reductions in activities for technical basis studies, and a change in pension strategy. These reductions will not restrict NNSA's ability to annually assess system performance and reliability.

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs FY 2016
• **Development Studies/Capability Improvements:** Provide laboratory and management expertise to POG and DOD Safety Studies.	• **Development Studies/Capability Improvements:** Provide laboratory and management expertise to POG and DOD Safety Studies.	
W78 Stockpile Systems $64,092,000	**W78 Stockpile Systems $56,413,000**	**W78 Stockpile Systems -$7,679,000**
• **Weapon Maintenance:** Achieve weapon repair FPU, continue maintenance activities in accordance with directive documents (PCD) and execute repairs. Rebuild of stockpile surveillance samples. Production of LLC and replacement components as required. • **Weapon Surveillance:** Continue surveillance activities including but not limited to D&Is, system-level laboratory tests, joint flight testing, CMEs, and assessment. • **Weapon Assessment and Support:** Continue weapon assessment activities necessary to complete Weapon Reliability and AAR, to include laboratory testing and analysis, and SFIs as required. • **Development Studies/Capability Improvements:** Conduct feasibility studies as required and in conjunction with DOD as necessary.	• **Weapon Maintenance:** Conduct maintenance activities in accordance with directive documents (PCD) and execute repairs. Rebuild of stockpile surveillance samples. Production of LLC and replacement components as required. • **Weapon Surveillance:** Continue to conduct surveillance activities in accordance with directive documents, to include D&Is, system-level laboratory tests, joint flight testing, decrease in CMEs, and assessment. • **Weapon Assessment and Support:** Continue weapon assessment activities necessary to complete Weapon Reliability and AARs to include laboratory testing and analysis, SFIs as required. • **Development Studies/Capability Improvements:** Conduct studies in conjunction with DOD as necessary.	• The decrease represents a planned reduction in Weapons Surveillance reducing CMEs and assessments, a decrease to rebalance between Stockpile Systems and Production Support primarily at CNS, a reduction in Development Studies for weapon feasibility activities, and a change in pension strategy. These reductions will not restrict NNSA's ability to annually assess system performance and reliability.
W80 Stockpile Systems $68,005,000	**W80 Stockpile Systems $64,631,000**	**W80 Stockpile Systems -$3,374,000**
• **Weapon Maintenance:** Continue to produce LLCs. Continue W80 NG qualification activities in support of FPU. Continue Alt 369 and D&I Authorization Basis (AB) activities in support of a W80-1 Alt 369 FPU. • **Weapon Surveillance:** Continue surveillance activities to including but not limited to D&I, system-level laboratory and joint flight testing, joint flight testing, CME, assessment, and platform compatibility and testing activities.	• **Weapon Maintenance:** Continue to produce LLCs. Complete W80 NG qualification activities to achieve FPU in FY 2017. Complete Alt 369 and D&I AB activities to achieve FPU for the W80-1 Alt 369 FY 2017. • **Weapon Surveillance:** Continue surveillance activities to include but not limited to D&I, system-level laboratory and joint flight testing, joint flight testing, CME, assessment, and platform compatibility and testing activities.	• The decrease represents the expected completion of W80-1 Alt 369 FPU, and a decrease resulting from a change in pension strategy partially offset by increases for Weapons Surveillance and to rebalance between Stockpile Systems and Production Support primarily at CNS. These reductions will not restrict NNSA's ability to annually assess system performance and reliability.

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs FY 2016
• **Weapon Assessment and Support:** Continue weapon assessment activities necessary to complete Weapon Reliability and AARs, which include laboratory testing and analysis, and SFIs as required. • **Development Studies/Capability Improvements:** Continue development activities for the Small Ferroelectric NG. Conduct feasibility studies as required in conjunction with DOD, as necessary.	• **Weapon Assessment and Support:** Continue weapon assessment activities necessary to complete Weapon Reliability and AARs, which include laboratory testing and analysis, and SFIs as required. • **Development Studies/Capability Improvements:** Continue development activities for the Small Ferroelectric NG. Conduct feasibility studies as required in conjunction with DOD, as necessary.	
B83 Stockpile Systems $42,177,000	**B83 Stockpile Systems $41,659,000**	**B83 Stockpile Systems -$518,000**
• **Weapon Maintenance:** Continue to support LLCE operations for replacement of aging components as required. • **Weapon Surveillance:** Continue surveillance activities, including, but not limited to D&Is, system-level laboratory tests, joint flight tests, CMEs, and assessment. • **Weapon Assessment and Support:** Continue weapon assessment activities necessary to complete Weapon Reliability and AARs, to include laboratory testing and analysis, and SFIs as required. • **Development Studies/Capability Improvements:** No activities planned.	• **Weapon Maintenance:** Continue to support LLCE operations for replacement of aging components as required. • **Weapon Surveillance:** Continue surveillance activities, including, but not limited to D&Is, system-level laboratory tests, joint flight tests, CMEs, and assessment. • **Weapon Assessment and Support:** Continue weapon assessment activities necessary to complete Weapon Reliability and AARs, to include laboratory testing and analysis, and SFIs as required. • **Development Studies/Capability Improvements:** No activities planned.	• The decease represents a planned reduction in surveillance activities, and a decrease resulting from a change in pension strategy offset by an increase for weapons maintenance and assessment activities. These reductions will not restrict NNSA's ability to annually assess system performance and reliability.
W87 Stockpile Systems $89,299,000	**W87 Stockpile Systems $81,982,000**	**W87 Stockpile Systems -$7,317,000**
• **Weapon Maintenance:** Continue full scale production of Small Ferroelectric NGs and NG exchanges. Continue activities for qualification of new GTS (Alt 360) with an FPU in FY 2019. Continue firing set development and qualification activities with FPU in FY 2019. Rebuild of stockpile surveillance samples. Production of LLC and replacement components as required.	• **Weapon Maintenance:** Continue full-scale production of Small Ferroelectric NGs at a lower rate than FY 2016 and NG exchange. Continue activities for qualification of new GTS (Alt 360) with an FPU in FY 2019. Continue firing set development and qualification activities at a lower rate than FY 2016 with a first production unit in FY 2019. Rebuild of stockpile surveillance	• The decrease represents a planned reduction in Component Testing and other surveillance activities, a decrease in weapons maintenance for NG production and firing set assembly rebuilds, a decrease in the Engineering Development scope for GTS (Alt 360) development activities, a decrease in weapon assessment technical basis activities, and from a change in pension strategy; partially offset by an

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs FY 2016
• **Weapon Surveillance:** Continue surveillance activities include D&I, system-level laboratory and joint flight testing, CMEs, and platform compatibility and testing activities. In addition, Retrofit Evaluation System Tests for the W87 LLCE and Firing Set Rebuilds will continue in FY 2016. • **Weapon Assessment and Support:** Continue weapon assessment necessary to complete Weapon Reliability and AARs, to include laboratory/site testing and analysis, POG and DOD safety studies, and SFIs. • **Development Studies/Capability Improvement**s: Continue product realization activities for W87 Alt 360. Continue feasibility studies as required in conjunction with DOD.	samples. Production of LLC and replacement components as required. • **Weapon Surveillance:** Continue surveillance activities at a lower rate than FY 2016 in accordance with directive documents, to include D&I, system-level laboratory and joint flight testing, decreased support for CMEs. In addition, Retrofit Evaluation System Tests for the W87 LLCE and Firing Set Rebuilds will continue at a lower rate than in FY 2016. • **Weapon Assessment and Support:** Continue weapon assessment activities necessary to complete Weapon Reliability and AARs to include laboratory testing and analysis, SFIs as required. Decreased Technical Basis activities as compared to FY 2016. • **Development Studies/Capability Improvements:** Continue product realization activities for W87 Alt 360. This reflects a reduced Engineering Development scope in comparison to FY 2016.	increase to rebalance between Stockpile Systems and Production Support primarily at CNS. These reductions will not restrict NNSA's ability to annually assess system performance and reliability.
W88 Stockpile Systems $115,685,000	**W88 Stockpile Systems $103,074,000**	**W88 Stockpile Systems -$12,611,000**
• **Weapon Maintenance:** Continue to execute production of weapon components required for repair, maintenance, and replacement. Continue design development and qualification activities to achieve full-scale NG production in FY 2019 (including NG PPI activities). Continue production qualification activities for the GTS supporting LLCE beginning in FY 2020. Rebuild of stockpile surveillance samples. • **Weapon Surveillance:** Continue surveillance activities to include D&I, system-level laboratory and joint flight testing, CME, and platform compatibility and testing activities.	• **Weapon Maintenance:** Continue to execute production of weapon components required for repair, maintenance, and replacement. Continue design development and qualification activities to achieve full-scale NG production in FY 2019. Continue production qualification activities for the GTS supporting LLCE beginning in FY 2020. Rebuild stockpile surveillance samples. • **Weapon Surveillance:** Continue surveillance activities to include D&I, system-level laboratory and joint flight testing, CME, and platform compatibility and testing activities. Reduced component surveillance activities.	• The decrease represents a planned reduction in assessment and surveillance activities, a decrease to rebalance between Stockpile Systems and Production Support primarily at CNS, and a change in pension strategy. These reductions will not restrict NNSA's ability to annually assess system performance and reliability.

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs FY 2016
• **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. Initiate the Collaborative Authorization for the Safety-Basis Total Lifecycle Environment (CASTLE) transition program • **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 remanufacture of GTS. Conduct appropriate studies in conjunction with DOD; provide laboratory and management expertise to the POG and DOD Safety Studies. The surety implementation for the W88 is being initiated based on the completion of the surety comparison of concepts and the selection of the technology.	• **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 enables the system to continue Pantex operations. This also enables a limited scope NESS or Nuclear Explosive Safety Change Evaluation to authorize continued W88 operations in FY 2019. • **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 remanufacture of GTS. Conduct appropriate studies in conjunction with DOD; provide laboratory and management expertise to the POG and DOD safety studies. Continue the surety implementation on the W88 system.	

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, characterization of components to identify both hazards and classification issues, 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; procuring shipping and staging storage equipment; 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 Safe Secure Transport for movement of weapons and weapons components.

FY 2018 - FY 2021 Key Milestones

- Continue activities as stated in the annual Dismantlement Program Plan.
- Continue progress on dismantling weapons retired prior to FY 2009, to include a 20% acceleration to schedule that will conclude the program of record by the end of 2021.
- Provide material and hardware for the life extension programs.
- Provide material for external customers (e.g. Naval Reactors program).
- Significantly reduce or eliminate legacy inventories at each site by the end of FY 2019.

Activities and Explanation of Changes

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs FY 2016
Weapons Dismantlement and Disposition (WDD) $52,000,000	**Weapons Dismantlement and Disposition (WDD) $68,984,000**	**Weapons Dismantlement and Disposition (WDD) +$16,984,000**
• Pursue a balanced approach to dismantling warheads and canned sub-assemblies (CSAs) and increase scope. • 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). • Y-12 will receive CSAs to sustain the Pantex dismantlement line. • Kansas City National Security Campus and Savannah River will continue annual disposition activities. • The LLNL, LANL, and SNL will provide technical expertise for systems in dismantlement. • Sites will disposition legacy components. • The LLNL, LANL, and SNL will refine safety test plans for system in retirement.	• Complete upfront planning for the W84 project. • Pursue a balanced approach to dismantling warheads and CSAs and increase scope. • 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). • Y-12 will receive CSAs to sustain the Pantex dismantlement line. • Kansas City National Security Campus and Savannah River will continue annual disposition activities. • The LLNL, LANL, and SNL will provide technical expertise for systems in dismantlement. • Sites will disposition legacy components. • The LLNL, LANL, and SNL will refine safety test plans for systems in retirement. • Pantex will begin efforts to accelerate dismantlement of U.S. nuclear warheads by 20%.	• The increase is due to the strategy to mitigate requirements in selected LEP materials, for W84 project scope, for continued effort and progress toward meeting the President's intent to accelerate dismantlement of retired U.S. nuclear warheads by 20 percent, and a change in pension strategy.

Directed Stockpile Work
Stockpile Services

Description
Stockpile Services provide the logistical, mechanical and support foundation for all DSW operations that are applicable to multiple weapon system in the enduring 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 stockpile; R&D Certification and Safety (RDCS) oversees the applied R&D, fundamental engineering early-stage technology maturation, and safeguard technologies to meet emerging threats. The RDCS Program is also responsible for addressing stockpile issues across multiple weapon systems concerning performance aging technologies (these components are also referred to as sunset technologies), as well as processing and qualifying replacement components for the existing stockpile. Management, Technology, and Production, provides quality engineering and plant management, technology, maintenance and/or replacement of weapons related equipment, and production services. The Plutonium Sustainment and Tritium Sustainment programs have moved to the Strategic Materials program.

Production Support
Production Support is the backbone for the manufacturing capability of the stockpile and includes those activities that provide the capability and capacity to sustain the nuclear security enterprise's production mission. The production mission is defined as weapon assembly, weapon disassembly, component production, and weapon safety and reliability testing. Production Support funding not only sustains current DSW capabilities, but enables the modernization of the production capabilities to improve efficiency and to prepare manufacturing operations to meet future requirements. To gain cost efficiency for neutron generators, Production Support will provide base NG capability (e.g. people, equipment, infrastructure) for all weapon systems, while the individual weapon systems fund the production of system specific NG. This funding model will continue to enhance mission performance for the nuclear security enterprise. As indicated previously, Production Support requires close coordination with the Component Manufacturing Development (CMD) activity under the Advanced Manufacturing Development (AMD) 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 develop 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, internal production-related transportation and internal production related safety activities. It also includes classified manufacturing operations that are not 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 (WR) products, measurement standards and calibration techniques, calibration of equipment, tooling, gages and testers, and QA-related equipment/process for certification;

(4) Tool, Gage, and Equipment Services – Activities that include preparation of specifications and designs for non-weapon-type specific tooling (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, and procurement processes and maintenance (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 computer systems (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. Supported systems are in both unclassified and classified environments that enable manufacturing and quality assurance functions. In these environments, information technology elements are directly linked to plant-wide production.

Research and Development (R&D) Support

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 that include: multiple system flight tests, archiving of weapons data required to validate and verify computational and predictive methods without the use of underground tests (UGTs), updating R&D and engineering tools to remain current with evolving technology, securing databases for Joint Integrated Lifecycle Surety (JILS) activities, and liaison support between design agencies (DAs) and production agencies (PAs). 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 – Activities include maintaining and upgrading computer systems and research tools, and providing subject matter experts (SMEs) and research personnel with technical skill training critical to R&D mission scope.

(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; Program Management assignments of R&D laboratory personnel detailed to federal organizations; and activities associated with managing and executing R&D support service contracts.

(3) Laboratory Research and Development Support to the Production Agencies – Covers laboratory work required to support the production plants' R&D endeavors.

(4) Quality Control for Research and Development -– Ensures that quality control procedures and methods are implemented in R&D activities.

(5) Joint Integrated Lifecycle Surety (JILS) – Evaluates potential surety improvements to the nuclear security enterprise. This is accomplished by assuming the existence of a proposed improvement in either weapon use control capability or weapon physical security and reassessing the security risks associated with selected venues. The updated risk assessments are then compared to the baseline assessment. JILS maintenance consists of database administration of the data stored by the tool's data tables 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.

Research and Development Certification and Safety (RDCS)

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. Additionally, RDCS addresses and resolves current and emerging stockpile issues. Conducted primarily by the national laboratories and supported by the production sites, the RDCS scope of responsibilities includes (1) Weapon Component Development (WCD), (2) Nuclear Safety Research and Development (NSRD), (3) Safeguard Technologies and Integrated Surety Architectures (ISA), (4) Applied R&D Studies, (5) Base Hydrodynamic Experiments, (6) Dynamic Plutonium Experiments, and (7) oversight of DOE and DOD collaborations.

The RDCS mission scope includes:

(1) Weapon Component Development (WCD) – Activities are 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. In these efforts, WCD oversees the early-stage development of LLCs designed to replace sunset technologies; the latter can be defined as components facing performance, aging, and 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 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 significantly 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.

- Neutron Generators (NGs): Activities required for continual development and improvements associated with NG technologies to offset aging effects (e.g., components and materials), and development and qualification of improved 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 source microelectronics, control systems, and additional features.

- 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.

- System Engineering and Integration: Activities required to ensure integration of system concepts and revised architecture engineering for the existing stockpile.

(2) Nuclear Safety Research and Development (NSRD) – NSRD involves research activities associated with nuclear operations leading to development of safety technologies with strategic partners; technology applications for increased surety of materials; and improvements in safe nuclear explosive operations.

(3) Safeguard Technologies – Includes activities associated with exploration and implementation of weapon system concepts and the associated enabling technologies that effectively supplement physical security. The immediate objective involves further reduction of risk associated with NNSA weapon transportation operations.

- Transportation Security: Activities associated with modifications to the SafeGuards Transporter that are common to all applications.

- Air Delivered Weapon Applications: Activities associated with the development of the multi-application transportation attachment device (MTAD).

- Weapon Unique Applications: Technology maturation activities associated with development of unique shipping configuration hardware for specific re-entry bodies and re-entry vehicles.

(4) 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.

(5) Base Hydrodynamic 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; 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.

(6) 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.

(7) 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 Memorandum of Understanding.

Management, Technology, and Production (MTP)
The MTP activities provide the products, components and/or services for multi-weapon system surveillance (laboratory/flight test data collection and analysis), weapons reliability reporting to the DOD, weapon logistics and accountability, and stockpile planning. MTP funding is used to provide plant and laboratory personnel to help sustain the stockpile that includes activities relating to surveillance, weapons requirements process improvements, engineering authorizations, safety assessments, use control technologies used to keep the weapons safe, secure and available to the war fighter upon presidential release authority, containers, base spares used to sustain weapons in a safe reliable status, studies and assessments with respect to nuclear operation safety, weapon components for use in multiple weapons systems and transportation/handling gear used to safely and securely store weapons and transport weapons between DOD sites and DOE sites for use in multiple weapons systems. MTP funding is pooled across the sites for a coordinated product realization enterprise approach for information systems used to record weapon and component transactional activities, an essential program for weapon stockpile inventory and accountability reporting used to report quantities, values and status to Congress. Additionally, MTP includes weapons sustainment activities that benefit the nuclear security enterprise mission as a whole, as opposed to Production Support activities that focus on supporting internal site-specific production missions.

The MTP mission scope includes:

(1) Product Realization Integrated Digital Enterprise (PRIDE): Operation and maintenance of 44 classified electronic information management systems required for weapons accountability, vendor material purchases, viewing/transfer of design and engineering drawings, and transit for surveillance, LLCEs, dismantlements, and weapons refurbishment and manufacturing.

(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.

(3) Studies and Initiatives: Currently, one initiative that identifies, prioritizes, and funds critical depleted uranium-related requirements (skilled labor, casting, rolling, forming and machining) that re-establishes capability at Y-12 to manufacture cases and CSAs for the stockpile and a material capability required for future LEPs.

(4) General Management Support: Non-programmatic costs for program management and oversight, shared taxes, assignees and support services contracts.

(5) Assessments & Studies (Use Control): Include 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 life extension program 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, reliability assessments, flight test planning) directly contributing to stockpile evaluation.

(7) External Production Missions: Weapon Response subject matter experts across all systems and all laboratories – Weapon Response manning is critical to sustain operations at Pantex. Safe operations and weapon delivery schedules are reliant on throughput at the Pantex bays.

(8) Base Spares (Production): Activities associated with production of new non-weapon specific base spares, container, LLC forging procurements, detonators, mock HE and other weapon components.

(9) Base Spares (Maintenance): Activities associated with maintaining existing non-weapon specific base spares, test handling gear and containers, GTSs, Use Control equipment, code management switch tubes and other weapon components.

FY 2018-FY 2021 Key Milestones
Production Support (PS)

- Continue weapon assembly, weapon disassembly, component production, and weapon safety and reliability testing.
- During FY 2018, Kansas City National Security Campus continues preparation for B61-12 LEP non-nuclear components.
- Continue five NG production lines at SNL, requiring increased quality and calibration services.
- Continue the funding of Nuclear Enterprise Assurance at SNL & Kansas City National Security Campus.
- During FY 2018 – FY 2019, B61-12 LEP equipment and process costs will be supported for NG and production workload increases to meet schedules.
- During FY 2018 – FY 2021, increased funding is required at Y-12 to support Lithium Direct Material Manufacturing.
- During FY 2018 – FY 2021, establish a multi-year acquisition program to upgrade and integrate weapon logistics, nuclear materials accountability, production planning and scheduling systems.
- During FY 2018 – FY 2021, LANL Detonator Cable Assembly (DCA) production increases from one to five lines, requiring new equipment to enable higher yield rates, increased maintenance, improved shop floor design, and a manufacturing modernization project to support increased production.

- During FY 2018 – FY 2021, LANL surveillance requirements in structural mock unit production and power supply surveillance increase to support the LEP schedule.

Research and Development (R&D) Support

- Continue providing scientific and technical support to the production agencies to help achieve weapon production directives.
- Continue supporting the operation and maintenance of the JILS Database at the design agencies.
- Continue archiving weapon data and upgrading R&D and engineering tools to remain current with evolving technologies.
- Support legacy commitments by maintaining the Nuclear Testing Heritage program.

R&D Certification and Safety (RDCS)

- Annually assess 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.
- Analyze, evaluate, and close high priority SFIs in accordance with the currently approved baseline closure plans.
- Design and develop LLCs including: NGs, GTSs, batteries, energetics, and other replacement components.
- Identify any necessary components that may need to be developed and matured for future insertion opportunities to support approved MODs/Alts.
- Perform nuclear safety R&D (NSRD) studies and weapons effects studies.
- Provide the infrastructure support for conducting hydrodynamic tests in support of enduring stockpile systems and multiple system experiments.
- Develop hardware qualification, system certification, and required computer modeling and simulation activities to sustain the stockpile.
- Analyze stockpile primary, secondary, chemistry, and materials systems analysis, and support annual assessments related to activities for the enduring stockpile.
- Support subcritical and other experiments at Nevada National Security Site.
- Support 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.
- Execute early-stage technical maturation of components for multiple weapons systems.
- Initiate development of ISA multi-application transportation device (MTAD) for air-delivered weapons.
- Development of ISA shipping configurations and required modifications to the Safeguards Transporters (SGTs) and Safeguard Technologies for multiple systems in the enduring stockpile.

Management, Technology, and Production (MTP)

- Continue annual activities providing products, components and/or services for multi-weapon system surveillance, weapons reliability reporting to the DOD, weapon logistics and accountability, and stockpile planning.
- Continue use control technology and Code Management System upgrades to enter the design stage.
- Increased surveillance requirements in FY 2018 - FY 2021 due to stockpile aging projections, infrastructure reinvestment and LEPS entering production.
- Increased weapon response activity for pit and CSA non-destructive evaluations
- Increase in flight testing support for the Tonopah Test Range.
- Replacement of the multi-port test valve for the GTS function testing at Savannah River Site for all systems.
- Replacement of the nuclear security enterprise Image Management System (IMS) for authorized document production with the Product Realization Information Management Enterprise (PRIME) technology stack.
- Critical skills programs will continue to recruit, train, and retain the needed skills base for science and engineering, testing, and manufacturing.

Activities and Explanation of Changes

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs FY 2016
Production Support (PS) $447,527,000	**Production Support (PS) $457,043,000**	**Production Support (PS) +$9,516,000**
• Provide engineering and manufacturing operations for weapon operations (life extension programs, surveillance, dismantlement, and component production, etc.) so that directive schedules and DOD deliveries can be achieved. • Provide labor to support purchasing, shipping, and materials management. Provide labor and supplies for preventative maintenance and equipment calibrations. Perform product certification (independent evaluation of build records) for auditing purposes. • Provide quality assurance and procedural/engineering safety. • Provide classified computer network operations and maintenance. • 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 300 plus active testers. • Continue to maintain equipment and processes for NG and power supply production to meet revised schedules. • Complete KCRIMS restart of operations by requalification of products and testers. • Perform infrastructure modernization. • Complete special projects (environmental conditioning, oven consolidation, calorimeter replacement, mass spectrometer replacement, and classified servers). • Expand to five NG production lines at SNL.	• Provide engineering and manufacturing operations for weapon operations (life extension programs, surveillance, dismantlement, and component production, etc.) so that directive schedules and DOD deliveries can be achieved. • Provide labor to support purchasing, shipping, and materials management. • Provide labor and supplies for preventative maintenance and equipment calibrations. Perform product certification (independent evaluation of build records) for auditing purposes. • Provide quality assurance and procedural/engineering safety. • Provide classified computer network operations and maintenance. • Continue MMP at LANL. • Provide maintenance and troubleshooting support for 300 plus active testers. • Continue to maintain equipment and processes for NG and power supply production to meet revised schedules. • Perform infrastructure modernization. • Complete special projects (environmental conditioning, Function Test Station Laser replacement, digital radiography in glovebox, load line 6 upgrades) • Expand to five (from two) Neutron Generator production lines at SNL, requiring increased quality and calibration services.	• Includes an increase to support LANL's MMP to digitize product sales due to upcoming sales rates requirements of power sources, detonator cable assemblies, and pits; an increase resulting from the transfer of budget authority from Infrastructure and Operations to maintain workforce critical skills at Enterprise Sites, an increase to rebalance between Stockpile Systems and Production Support primarily at Pantex, partially offset by a decrease resulting from a change in pension strategy.

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs FY 2016
• Kansas City National Security Complex begins preparation for B61-12 LEP non-nuclear components. • Begin funding Nuclear Enterprise Assurance at SNL and the Kansas City National Security Complex. • Deferred maintenance at Y-12 for Lithium Direct Material Manufacturing.	• Kansas City National Security Campus continues preparation (engineering and quality) for B61-12 LEP non-nuclear components. • Continue funding Nuclear Enterprise Assurance at SNL and Kansas City National Security Campus. • Hiring and training personnel at Y-12 for Lithium Direct Material Manufacturing.	
Research and Development (R&D) Support $41,059,000	**Research and Development (R&D) Support $34,187,000**	**Research and Development (R&D) Support -$6,872,000**
• 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 agencies 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 NNSA DAs. • Support legacy commitments by maintaining the Nuclear Testing Heritage program. Conduct R&D projects for new technologies in support of LEP and stockpile modernization.	• 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 agencies 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 agencies • Continue supporting legacy commitments by maintaining Nuclear Testing Heritage activities Continue supporting the early science development of new cross cutting technologies, focusing on efforts that support weapons LEPs, including SNL's development of radiation hardened transistors and advanced radiography technologies. Continue supporting legacy commitments from nuclear testing. This includes	The decrease reflects a narrowing of technology development efforts and a change in pension strategy.

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs FY 2016
	seismic monitoring, groundwater maintenance, protection, maintenance of certain test facilities and equipment at NNSS, maintaining the Nuclear Testing Archive, and accelerated efforts at LANL and LLNL to stabilize and digitize nuclear testing data.	
R&D Certification and Safety (RDCS) $185,000,000	**R&D Certification and Safety (RDCS) $156,481,000**	**R&D Certification and Safety (RDCS) -$28,519,000**
• Continue to annually assess 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 design and development of GTS for the W87 Alt. • 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	• Continue supporting the ISA project for enhanced safety and security during transportation of nuclear weapons between DOE and DOD sites • 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. • Continue upgrade of the Code Management System for the legacy stockpile. • Continue limited design and development of LLCEs such as NGs, GTSs, energetics, and other replacement components. • 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 Safeguards technology development and development of hardware qualification; required computer modeling and simulation activities to sustain the stockpile.	• The decrease represents a reduction in early technology development and advanced engineering efforts and a decrease resulting from a change in pension strategy.

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs FY 2016
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 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.	• 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 development of thermal batteries, abnormal launch accelerometers, detonation monitoring assemblies and other Safeguards components.	
Management, Technology, and Production (MTP) $264,994,000	**Management, Technology, and Production (MTP) $251,978,000**	**Management, Technology, and Production (MTP) -$13,016,000**
• Execute surveillance activities in accordance with FY 2016 PCDs, and FY 2016 Integrated Weapon Evaluation Team Plans (IWET). Includes critical deferred & required multi-system surveillance activities and testing requirements for the 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	• Execute surveillance activities in accordance with FY 2017 PCDs, and FY 2017 IWET Plans. Includes critical deferred and required multi-system surveillance activities to include testing requirements for the 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 IMS for authorized document production with the PRIME technology stack. • Study options to improve safety and use control technologies for future LEPs.	• The decrease represents planned reductions in multi-system activities supporting assembly/disassembly operations, assessment and studies, and multi-weapon management support and a change in pension strategy partially offset by an increase to maintain critical skills within the enterprise, an increase in multi-system weapon surveillance and an increase to rebalance between Stockpile Systems, Production Support, and MTP primarily at CNS.

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs FY 2016
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 and production agencies. • 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 (examples: 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.	• Perform operations and maintenance of the Integrated Digital Enterprise to collect, process, store, and transmit data among the nuclear security enterprise design and production agencies. • 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 (examples: 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. • Support efforts to attract and sustain an appropriately skilled workforce, including a Weapons Intern Program; recruiting and retention programs to fill critical, skilled positions in science and manufacturing; and technical skills training to maintain proficiency in existing technologies and develop proficiency with new technologies.	

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. The Uranium Sustainment line is consistent with recommendations of the Final Report of the Committee to Recommend Alternatives to the Uranium Processing Facility Plan in Meeting the Nation's Enriched Uranium Strategy (also known as the Red Team Report).

Uranium Sustainment
The Uranium Sustainment Program mission expands and accelerates 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) Expand and accelerate the Y-12 Area 5 de-inventory efforts to reduce safety, security, and mission risks by:
a. Continuing development of metrics to measure Material-at-Risk (MAR) reduction based on material types and contributions to offsite dose;
b. Reducing administrative building limits for MAR;
c. Further accelerating movement of weapon assemblies and materials to the Highly Enriched Uranium Materials Facility;
d. Perform additional safety analysis and material characterization in support of material disposition; and
e. Establish and implement processes in existing facilities to stop the flow of material in to Building 9212.

(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 that enables nuclear weapon planners and designers to sustain a safe, secure, and effective nuclear arsenal and plan for reduced nuclear stockpiles. 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) Investments in equipment and process design to support reconstitution of the power supply manufacturing and assembly capability (that once existed at the Mound and Pinellas facilities) for Defense Programs.

(2) 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.

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

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

(5) Fabrication of design definition development pits that explores new design features.

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

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

(8) 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.

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

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 began in FY 2007. Plans are being initiated to make additional production capacity available by gaining Nuclear Regulatory Commission (NRC) approval of a reactor safety analysis to allow irradiating more than the current limit of 704 TPBARs per cycle, and also for increasing the effluent release limit at Watts Bar, supported by a Supplemental Environmental Impact Statement (SEIS). The program has a contingency option to use additional TVA reactors to meet tritium production requirements. The tritium inventory is needed to support limited life component exchanges (LLCEs) for tritium reservoirs that are deployed in the stockpile. NNSA coordinates with DOD to determine stockpile requirements, 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, planning is being initiated to bring an additional TVA reactor into tritium production in the early 2020s.

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 TPBARs to evaluate the performance effects of 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 required 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.

(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 WBN1 reactor. This includes maintaining two vendors that provide the classified 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, who entered into an arrangement in May 2012 to have a quantity of DOE's high assay tails (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 separate work unit (SWU) in FY 2012 dollars, escalated at two percent a year. The subsequent softening of the uranium fuel market after the Fukushima event has caused the enrichment price differential payments to increase significantly compared to original estimates.

(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 Tritium Extraction Facility (TEF) at the Savannah River Site (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 must be transported to the Nevada National Security Site 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 up to 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 Department of Defense. Since starting, the TEF has been conducting one extraction a year. In FY 2017, the TEF will be conducting two extractions in succession. This is to exercise and evaluate the processes that will be required when the TEF must go to three extractions in FY 2019 and four extractions in FY 2021. In FY 2018, the TEF will go back to its normal 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 $500M facility requires a number of infrastructure improvement and upkeep projects, some of which span multiple years. The FY 2017 project work will include replacement of a remote camera and completion of the installation of a wireless air monitor.

Domestic Uranium Enrichment

The Domestic Uranium Enrichment (DUE) Program provides a reliable supply of U 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, 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. Near-term focus is on preserving and advancing the AC100 centrifuge technology and developing a small U.S. centrifuge design. Second, DUE will begin to develop a detailed acquisition strategy to reestablish a domestic uranium

enrichment capability to support tritium production at some point in the future. Third, 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 and are contingent upon funding.

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.
- Begin the acquisition process to establish mission need (CD-0) for a domestic uranium enrichment capability to support tritium production.
- Support down blending of HEU from the uranium inventory as needed.

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 National Nuclear Security Administration (NNSA) sites: three national security laboratories, four nuclear weapons production facilities, and the Nevada National Security Site. The program is comprised of four subprograms, Material Recycle and Recovery, Storage, Nuclear Material Integration, and Strategic Planning Efforts.

The Strategic Materials mission scope includes:

(1) Material Recycle and Recovery (MRR): provides recycling and recovery of plutonium, enriched uranium, lithium and tritium. The recycle and recovery of material is from the fabrication and assembly operations, limited-life component, and dismantlement of weapons and components. It also includes providing purified depleted uranium feedstock as required by supply and demand analysis.

At Y-12, these activities support the implementation of new, as well, as improved processes for fabrication and recovery operations, material stabilization, conversion, and interim storage. MRR activities for Defense Programs are aligned to support the W76-1 LEP production and planned future LEPs. All other uranium related mission work supported by MRR funding including the accountability and salvage processes and maintaining a purified metal production capability needed for LEPs and Naval Reactors. In addition, MRR provides purified depleted uranium feedstock for the stockpile as required by supply and demand analysis.

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 Programs 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.

(2) Storage: provides for storage and management of pits, plutonium, enriched and depleted uranium, lithium, tritium, weapons components and other materials at Y-12, Pantex, Nevada National Security Site (NNSS), and LANL. The Storage scope includes development and implementation of containers compliant with DOE Manual (M) 441.1-1, at LANL, NNSS and Y-12. Storage includes design, development, certification, surveillance, testing and procurement of the on-site containers. In addition, 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 at Pantex. It also includes management and storage of nuclear materials, the long-term planning 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.

(3) 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.

(4) Strategic Planning Efforts: Initiates programmatic planning for the development of high explosive (HE), lithium, and micro-electronic infrastructure strategies. 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.

FY 2018-FY 2021 Key Milestones

Uranium Sustainment

- Continue reducing safety and security risks through the Area 5 de-inventory efforts by further accelerating the movement of weapon assemblies and materials to the Highly Enriched Uranium Materials Facility, performing additional safety analysis and material characterization in support of material disposition, and re-engineering process flows to stop the flow of material in to Building 9212.
- Support additional efforts to develop, sustain, and increase the reliability of uranium scientific and manufacturing capabilities.

Plutonium Sustainment

- Continue investments in replacing aged, end-of-life pit manufacturing equipment (acquire, install, configure, authorize for operation).
- Build W87 design developmental and process prove-in pits to sustain fabrication capability.
- Perform engineering evaluation of development pits (pit certification).
- Support reconstitution of power supply capability.
- Complete ^{238}Pu recovery.
- Participate in the LANL Landlord Cost Recovery Program based on services for: distributed, non-fixed operating costs (usually equated to space used) in the plutonium facility; analytical chemistry distributed variable, non-fixed costs; and waste processing distributed, non-fixed costs.

Tritium Sustainment

- Conduct successively increasing TPBAR irradiation cycles at TVA to begin producing 2,800 grams per cycle by FY 2025; bring up a second reactor for tritium production in the early 2020s; and use unobligated reactor fuel obtained by TVA from Energy Northwest under the Depleted Uranium Enrichment Project.
- Provide technical production support and surveillance for tritium production operations at TVA by the TPBAR design authority, Pacific Northwest National Laboratory (PNNL), to ensure technical oversight in support of TVA and NRC requirements.
- Continue performance tests on tritium-producing lithium-aluminate pellets in the Advanced Test Reactor (ATR) at Idaho National Laboratory (INL) and conduct post irradiation examinations (PIE) and data analysis.
- Continue to improve understanding and modeling of in-reactor TPBAR performance to reduce program risks and improve the safety and reliability of the tritium production process.
- Obtain NRC approval for an improved reactor safety analysis to reduce on-going reactor fuel requirements.
- Begin to ramp up the number of annual extractions at the TEF, and perform infrastructure improvement projects for safety and control systems.
- Fabricate TPBARs to meet 18-month reactor cycles, initiate contracts to restart production of major TPBAR components, and maintain the related component supply chain.

- Provide transportation for irradiated TPBARs from each cycle at WBN1 to the TEF and for post irradiation examinations.
- Provide transportation for disposal of tritium program radioactive waste from base plates and thimble plugs from TVA to the NNSS.
- Maintain a risk management program including monitoring of emerging technologies for future tritium production options.
- Complete irradiation of 1,104 TPBARs in Cycle 15 at WBN1 (September 2018).
- Commence irradiation of 1,504 TPBARs in Cycle 16 at WBN1 (October 2018).
- Complete irradiation of 1,504 TPBARS in Cycle 16 at WBN1 (March 2020).
- Begin irradiation of 1,792 TPBARS in Cycle 17 at WBN1 (April 2020).
- Complete irradiation of 1,792 TPBARs in Cycle 17 at WBN1 (September 2018 – 2021).
- Reactor selection and milestones for second reactor are pre-decisional.

Domestic Uranium Enrichment

- Contract to down-blend in FY 2019 – FY 2025 highly enriched uranium to unobligated low-enriched uranium to extend the need date for unobligated low-enriched uranium for tritium production.
- Issue FY 2018 Congressional Report per FY 2016 NDAA.

Strategic Materials

- Re-establish the depleted uranium (DU) feedstock capability.
- Continue to support DSW, Naval Reactors and Building 9212 de-inventory mission deliverables through the recycle of weapons-related materials at Y-12.
- Recycle and recovery of tritium at SRS for limited life component exchange demands.
- Complete recapitalization efforts for aging equipment at SRS.
- Recover schedule for the PF-4 vault de-inventory project and chemical processing at LANL.
- Complete material processing requirements to meet CMR de-inventory commitments at LANL by 2019.
- Develop, maintain, and disseminate nuclear criticality safety tools, training and data.
- Provide technical foundation for nuclear safety analysis and authorization basis for decision making.
- Complete development, qualification, production and delivery of first DPP-1 and DPP-3 containers by 2020.
- Treat and monitor legacy contamination at KCP, LLNL (Main Site and Site 300), Pantex and SNL.
- Complete processing of SNL sodium bonded fuel experiment assemblies and decommissioning of specialized project equipment by FY 2021.
- Continue to improve early strategic planning and analyses to better inform investment decisions regarding programmatic infrastructure.

Activities and Explanation of Changes

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs FY 2016
Uranium Sustainment $32,916,000	**Uranium Sustainment $20,988,000**	**Uranium Sustainment -$11,928,000**
• 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.	• 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. Support additional 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 $184,970,000**	**Plutonium Sustainment +$10,272,000**
• 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 (acquires, install, configure, authorize for operation). • Begin W87 design developmental pit builds. • Begin engineering evaluation of development pits (pit certification). • Continue to support reconstitution of Power Supply capability. • 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 (usually equated to space used) in the plutonium facility; analytical	• 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 (acquire, install, configure, authorize for operation). • Continue W87 design developmental pit builds. • Conduct engineering evaluation of development pits (pit certification). • Continue to support reconstitution of Power Supply capability. • 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 (usually equated to space used) in the plutonium facility; analytical	• The increase funds equipment procurements needed to increase pit production consistent with the FY 2015 NDAA, and conceptual planning and design activities for the Plutonium Modular Approach, partially offset by a decrease resulting from a change in pension strategy.

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs FY 2016
chemistry distributed variable, non-fixed costs; and waste processing distributed, non-fixed costs.	chemistry distributed variable, non-fixed costs; and waste processing distributed, non-fixed costs.	
Tritium Sustainment $104,600,000	**Tritium Sustainment $109,787,000**	**Tritium Sustainment +$5,187,000**
• Start irradiation of 704 TPBARs in TVA's Watts Bar reactor Cycle 14; reimburse TVA for irradiation services, management and engineering support, additional reactor fuel, and enrichment price differentials for unobligated fuel from Energy Northwest for Watts Bar Unit 1. • Prepare a second license amendment request (LAR) to the NRC to reduce fuel requirements and improve reactor operating margins. Maintain the TEF in responsive operations mode, conduct two TPBAR batch extractions, 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. • Begin fabrication of 1,104 TPBARs for reactor Cycle 15; award contracts for liner and pellet production and transfer getter plating from the design agent to the TPBAR fabricator. Ship TPBARs from TVA to the TEF.	• Start irradiation of 1104 TPBARs in Cycle 15 at WBN1; continue reactor core analysis for increased production and lower fuel enrichment; continue planning for a second tritium production reactor; provide fuel enrichment premiums for unobligated fuel from Energy Northwest; consolidate 704 Cycle 14 TPBARs for shipment to TEF; and maintain our unobligated fuel inventories. • Conduct two extractions at the TEF in preparation for three extractions in FY 2019 and four in FY 2021; conduct preventative maintenance to maintain TEF readiness, provide remote camera replacement and install wireless air monitor. • Maintain the TPBAR designer of record and address technical issues for increasing TPBAR production and NRC licensing actions; conduct post irradiation examination of Cycle 13 limited use assembly rods at PNNL for potential design refinements; complete irradiation of pellet performance testing 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 1104 TPBARs and deliver to TVA for WBN1 Cycle 15; continue procurements of new pellets, liners, full-length getters and other TPBAR components.	• The increase funds fabrication of TPBARs and procurement of TPBAR components to support increasing production rates, partially offset by a decrease resulting from a change in pension strategy.

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs FY 2016
	• Complete Cycle 13 TPBAR transport with two shipments to the TEF, and release competitive request for proposals for next TPBAR transportation contract.	
Domestic Uranium Enrichment $50,000,000	**Domestic Uranium Enrichment $50,000,000**	**Domestic Uranium Enrichment $0**
• Preserve and advance uranium enrichment expertise and technology to meet current and future U.S. government needs. Near-term focus is on the AC100 centrifuge technology and developing a small U.S. centrifuge design. • 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. Near-term focus is on the AC100 centrifuge technology and developing a small U.S. centrifuge design. • Continue the acquisition process to establish mission need (CD-0) for a domestic uranium enrichment capability to support tritium production	• No funding change.
Strategic Materials Sustainment $250,040,000	**Strategic Materials Sustainment $212,092,000**	**Strategic Materials Sustainment -$37,948,000**
• Continues to provide for recycling and recovery of plutonium, enriched uranium, lithium and tritium from fabrication and assembly operations, limited life components, dismantlement of weapons and nuclear components and re-establishes a purified depleted uranium supply. • Implements new or improved processes for fabrication and recovery operations, material stabilization, conversion, and in-process storage. • Recycles and purifies materials to meet specifications for safe, secure, and environmentally acceptable storage, and to meet the directive schedule for tritium reservoir refills, and to support the increased workload associated with LEP production rates, additional weapon surveillance activities, increased piece part	• Continues to provide 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 continues the process to re-establish a purified depleted uranium supply. • Implements new or improved processes for fabrication and recovery operations, material stabilization, conversion, and in-process storage. • Recycles and purifies 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, additional weapon surveillance activities, increased piece part disassembly's and increases in Campaign and Sustainment work in the nuclear facilities.	• The decrease includes a reduction in MRR due to the deferral of the reestablishment of a purified depleted uranium supply until evaluation of existing supplies and future demand is completed, and reductions in Strategic Planning Efforts reflecting the movement of planning for the plutonium modular approach to the Plutonium Sustainment line, and in conceptual planning and design of Capabilities Based Investment projects to the Capabilities Based Investments (CBI) line under Infrastructure and Operations (formerly RTBF), partially offset by increases to support lithium direct material manufacturing associated with other DSW activities, and to provide additional funding for Inactive Actinide processing at Y-12, recovery of spent Californium sources, and processing of sodium bonded fuel experiment assemblies

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs FY 2016
disassemblies and increases in Campaign and Sustainment work in the nuclear facilities. • At LANL, activities include accelerated material stabilization, repackaging, and excess materials management to de-inventory PF-4 vault, nuclear materials information management, special recovery line work, confinement vessel disposition, CMR de-inventory, and nuclear materials planning and reporting. Accelerated vault de-inventory reduces nuclear safety risks and supports current and future needs for material storage associated with Pu^{238} and Pu^{239} operations, DSW, Research, Development, Testing, and Evaluation program activities, and other Defense Program missions in PF-4. Vault activities include assay, storage, packaging, transportation and waste disposal. Alternatives for processing and storage of LANL materials at Y-12, SRS, and Nevada Nuclear Security Site will also be evaluated and optimized. Recovery of the schedule lost due to the PF-4 programmatic pause of 2013 will continue through FY2015 and, as necessary, in FY 2016. • At the SRS Tritium Extraction Facility, activities include recovery and purification of tritium, deuterium, and helium-3 gases from reservoir recycle gas, hydride storage vessels, and facility effluent cleanup systems. Gas mixtures are enriched to support the DSW schedules. • At Y-12, activities include uranium purification and conversion to UO_3, waste processing, conversion of enriched uranium	• Other activities include uranium purification and conversion to UO_3, waste processing, conversion of enriched uranium oxide to metal buttons, material transport and storage, and processing enriched uranium chips and scraps, and lithium salvage operations. Supports increase in dismantlements. Increased production of purified metal and material processing will be necessary to support de-inventory and facilitate transition goals. • MRR also funds the Central Scrap Management Office that manages the receipt, storage, and shipment of enriched uranium scrap and the Precious Metals Business Center that provides a cost-effective service to many users within the DOE complex. • Provides 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 Supports loading, operating, and maintaining of the HEU Materials Facility, including the procurement of DOE M 441.1-1 compliant containers. o Provides for the facility improvements efforts for non-materials access area facilities. o Provides the long-term planning and analysis of materials required for the Y-12 manufacturing strategy in support of the nuclear weapons stockpile. • Continues to support the emphasis on nuclear material consolidation and de-inventory activities across the nuclear security enterprise.	

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs FY 2016
oxide to metal buttons, material transport and storage, and processing enriched uranium chips and scraps, and lithium salvage operations. Increased production of purified metal and material processing will be necessary to support de-inventory, and to facilitate transition goals. MRR also funds the Central Scrap Management Office that manages the receipt, storage, and shipment of enriched uranium scrap, and the Precious Metals Business Center that provides a cost-effective service to many users within the DOE complex. In addition, MRR scope will be increased to provide for high-purity depleted uranium feedstock. Specifically, FY 2016 funding supports the effort to re-establish the capability for conversion of DUF_6 to DUF_4 for high-purity depleted uranium feedstock and will, therefore, require a significant funding adjustment from FY 2015. • Continues to provide for effective storage and management of pits, high enriched uranium (HEU), and other weapons nuclear and non-nuclear materials. Includes: receipt, storage, and inventory of nuclear materials, non-nuclear materials, HEU, depleted uranium and lithium. o At LANL, activities include onsite SAVY-4000 storage container certification, surveillance, testing and procurements. o At Pantex, activities include long-term storage of special nuclear materials, which involve planning, engineering, design, and start-up activities; processing and repackaging materials for safe storage; storage activities for	• In partnership with the Nuclear Regulatory Commission, 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 Idaho National Laboratory (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 the Savannah River Site. • Perform planning studies and analyses relating to the life-cycle management of nuclear materials. • Continue development of High Explosive, Lithium, and Micro-electronic 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.	

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs FY 2016
the strategic reserve; national security inventory thermal monitoring and characterizations; disposition of legacy materials; and nuclear materials management, including planning, assessment, and forecasting nuclear material requirements. Funding includes pit surveillance and provides for installation of the second High Resolution Computed Tomography capability (CoLOSSIS II). o At Y-12, activities include the management and storage of uranium, lithium, and other nuclear and weapons materials, including the nation's strategic reserve of HEU. The Storage subprogram supports the loading, operating, and maintaining of HEU Materials Facility. This subprogram also provides the long-term planning and analysis of materials required for the Y-12 manufacturing strategy in support of the nuclear weapons stockpile. • Continues to support the emphasis on nuclear material consolidation and de-inventory activities across the nuclear security enterprise. • In partnership with the Nuclear Regulatory Commission, continue to support the operation and maintenance of NMMSS. • Continue activities to support the removal of plutonium-bearing mixed oxide fuel from SNL and complete pre-receipt preparations, cask certification, and temporary storage of plutonium-bearing mixed oxide fuel at SNL prior to disposal.		

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs FY 2016
• Continue inactive actinides activities to support the treatment, consolidation and disposition of NNSA SNM that is no longer required to support the nuclear security enterprise mission at ORNL, LANL, and Y-12. • Continue the process and disposition NNSA materials currently stored at non-NNSA sites including the Idaho National Laboratory (sodium bonded fuels currently from or at SNL). • Maintain the technical support and cost analyses relating to the management of Heavy Isotopes Lead Material Management Organization (LMMO) at Oak Ridge National Laboratory. • Complete planning and continue activities to process and recover Pu-244 and other national asset isotopes from Mk-18a targets in storage at Savannah River. • The NMI program will also perform planning studies and analyses relating to the life-cycle management of nuclear materials. • Strategic Planning Efforts include development of programmatic strategies for materials of strategic significance, including planning for the plutonium modular approach, and conceptual planning and design of Capabilities Based Investment (CBI) projects.		

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 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	2021
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	100% of stockpile certified	100% of stockpile certified	100% of stockpile certified	100% of stockpile certified
Result	100						
Endpoint Target	Annually, maintain 100% of warheads in the stockpile as safe, secure, reliable, and available to the President for deployment.						
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	100% of annual planned dismantlements	100% of annual planned dismantlements	100% of annual planned dismantlements	100% of annual planned dismantlements
Result	66						
Endpoint Target	Complete by FY 2021 the dismantlement of all weapons systems retired prior to 2009.						
Steady State W76-1 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	100% of scheduled unit builds	100% of scheduled unit builds	N/A	N/A
Result	85						
Endpoint Target	Complete production of the NWC-approved W76-1 LEP production schedule by FY 2019.						
Note: This performance measure is used to track progress on the Nuclear Weapons agency priority goal.							
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	3,120 TPBARs	3,824 TPBARs	5,104 TPBARs	5,104 TPBARs	6,768 TPBARs	8,224 TPBARs
Result	3,120						

FY 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	2021

Endpoint Target

By the end of FY 2020, complete irradiation of 6,768 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 2016, the irradiation cycle started in October of 2015 and will be complete in March of 2017. Thus, there is no increase to the number of TPBARs irradiated in FY 2016 and, for the same reason, there is no increase in the number of TPBARs from FY 2018 to FY 2019.

Directed Stockpile Work
Capital Summary

(Dollars in Thousands)

	Total	Prior Years	FY 2015 Enacted	FY 2015 Current	FY 2016 Enacted	FY 2017 Request	FY 2017 vs FY 2016 Request
Capital Operating Expenses Summary (including (Major Items of Equipment (MIE)							
Capital Equipment >$500K (including MIE)	N/A	N/A	85,276	85,276	114,722	98,012	-16,710
Plant Projects (GPP) (<$10M)	N/A	N/A	2,453	2,453	2,507	2,562	+55
Total, Capital Operating Expenses	**0**	**0**	**87,729**	**87,729**	**117,229**	**100,574**	**-16,655**
Capital Equipment > $500K (including MIE)							
Total Non-MIE Capital Equipment (>$500K)	N/A	N/A	79,896	79,896	81,654	83,450	+1,796
Machine Tool Upgrades, Y-12	5,000	0	0	0	2,500	2,500	0
5-Axis Milling Machine Replacement (2 each) - High	5,000	0	0	0	5,000	0	-5,000
Vertical Turret Lathe Replacement (3 each) - High Explosives, PX	6,300	0	0	0	6,300	0	-6,300
5-Axis Milling Machine Replacement (2 each) - Insensitive High Explosives, PX	5,000	0	0	0	5,000	0	-5,000
Vertical Turret Lathe Replacement (3 each) - Insensitive High Explosives, PX	6,300	0	0	0	6,300	0	-6,300
Coordinate Measurement Machine #1, PX	5,385	0	0	0	3,118	2,267	-851
Coordinate Measurement Machine #2, PX	3,645	0	0	0	850	2,795	+1,945
Sampling and Backfill Stations Modifications, PX	6,000	0	0	0	2,000	2,000	0
Cabinet Microfocus Computed Tomography, PX	3,000	0	0	0	1,500	1,500	0
Eight Plane Radiography - Evaluation of Internal SNM Material, PX	2,500	0	0	0	500	1,000	+500
Replacement of Electronic Beam Welder #1, LANL	9,000	3,620	5,380	5,380	0	0	0
Pit Reuse/Surveillance Workstation Modifications, PX	2,500	0	0	0	0	2,500	+2,500
Total, Capital Equipment (including MIE)	**59,630**	**3,620**	**85,276**	**85,276**	**114,722**	**98,012**	**-16,710**
Plant Projects (GPP and IGPP) (Total Estimated Cost (TEC) <$10M)							
Total Plant Projects (GPP) (Total Estimated Cost (TEC) <$5M)	N/A	N/A	2,453	2,453	2,507	2,562	+55
Total, Plant Projects (GPP) (Total Estimated Cost (TEC) <$10M)	**N/A**	**N/A**	**2,453**	**2,453**	**2,507**	**2,562**	**+55**
Total, Capital Summary	**N/A**	**N/A**	**87,729**	**87,729**	**117,229**	**100,574**	**-16,655**

Outyears for Directed Stockpile Work

(Dollars in Thousands)

	FY 2018 Request	FY 2019 Request	FY 2020 Request	FY 2021 Request
Capital Operating Expenses Summary (including (Major Items of Equipment (MIE)				
Capital Equipment >$500K (including MIE)	90,786	89,662	89,080	91,040
Plant Projects (GPP) (<$10M)	2,618	2,676	2,735	2,795
Total, Capital Operating Expenses	**93,404**	**92,338**	**91,815**	**93,835**
Capital Equipment > $500K (including MIE)				
Total Non-MIE Capital Equipment (>$500K)	85,286	87,162	89,080	91,040
Sampling and Backfill Stations Modifications, PX	2,000	0	0	0
Eight Plane Radiography - Evaluation of Internal SNM Material, PX	1,000	0	0	0
Machine Tool Upgrades, Y-12	2,500	2,500	0	0
Total, Capital Equipment (including MIE)	**90,786**	**89,662**	**89,080**	**91,040**
Plant Projects (GPP) (Total Estimated Cost (TEC) <$10M)				
Total Plant Projects (GPP) (Total Estimated Cost (TEC) <$5M)	2,618	2,676	2,735	2,795
Total, Plant Projects (GPP) (Total Estimated Cost (TEC) <$10M)	**2,618**	**2,676**	**2,735**	**2,795**
Total, Capital Summary	**93,404**	**92,338**	**91,815**	**93,835**

Science

Overview

The Science program provides the knowledge and expertise, and the confidence needed to maintain the nuclear stockpile without nuclear testing. Capabilities developed and maintained in the Science program: (1) provide the basis for annual assessments of weapon performance, (2) provide understanding of the impacts of surveillance findings to assure that the nuclear stockpile continues to meet military requirements, and (3) provide 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 to validate nuclear weapons performance simulations. These data are obtained 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 surrogates. These experiments and 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 and assessment community that resides at the National Nuclear Security Administration (NNSA) laboratories.

The Science program is directly linked to the Advanced Simulation and Computing (ASC), the Inertial Confinement Fusion Ignition and High Yield (ICF), the Engineering, and the Directed Stockpile Work (DSW) programs. Science also relies on scientific 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 2017 Budget Request

The FY 2017 Request provides efforts to support ongoing annual assessments and increases activities in four key areas to support future sustainment program options and system certification:

- Hydrodynamic and subcritical experiments (SCE). Hydrodynamic experiments (hydros) are funded in the Advanced Certification and in the Primary Assessment Technologies subprograms. The funding supports test parts and diagnostics for Science program hydros. SCEs are funded in the Dynamic Materials Properties subprogram, and correspond to essentially a third of the entire subprogram.
- Enhanced Capabilities for Subcritical Experiments (ECSE) to design and implement the diagnostics required for subcritical experiments. This work is funded in the Advanced Radiography subprogram.
- Certification Readiness Exercises (CREs) to investigate the technical readiness, feasibility, and potential use of new technologies. CREs are funded in the Advanced Certification subprogram.
- Assessment of the performance of U.S. nuclear weapons in hostile environments. Improvements to weapon output calculations for hostile environments are funded in the Secondary Assessment Technologies subprogram.

Focus areas for each of the subprograms are:

- *Advanced Certification* for CRE to support: (1) pit reuse and insensitive high explosives (IHE) designs, (2) advanced safety and security designs, (3) hardening concepts, and (4) designs of nuclear and structural components using additive manufacturing (AM) and other newly manufactured materials.
- *Primary Assessment Technologies*, where the focus is on: (1) design and analysis of hydrodynamic experiments and subcritical experiments (SCE), (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 SCEs.
- *Dynamic Materials Properties*, where the design, development, and execution of subcritical experiments occur, will: (1) execute two SCEs in support of upcoming sustainment programs, and (2) will conduct work focused on new high explosive formulas and the characterization of key stockpile materials, including plutonium and AM materials.

- *Advanced Radiography* to continue support of the ECSE effort to achieve the development and implementation of advanced diagnostics for SCEs. These efforts will be needed in the early FY 2020s to obtain experimental results from untested stockpile configurations involving plutonium reuse, IHE, and other modern configuration changes to support the sustainment program schedule.
- *Secondary Assessment Technologies,* where the major focus is on research and experimentation to understand weapon outputs, propagation (e.g., effects), and performance implications in hostile environments.
- *Academic Alliances and Partnerships* to support additional grants for basic science research relevant to the Stockpile Stewardship mission, consortium grants in Science, Technology, Engineering and Mathematics, (STEM) areas of interest to NNSA and DOE national laboratories, and development of peer to peer interactions among the Academic Alliances and Partnerships programs.[a]

Major Outyear Priorities and Assumptions
Major outyear priorities include:

- supporting sustainment program schedules through FY 2030 (as approved by the Nuclear Weapons Council and encapsulated in the Fiscal Year 2016 Stockpile Stewardship and Management Plan),
- continuing the ECSE diagnostics effort,
- developing the next-generation science and engineering workforce required to achieve future nuclear security objectives as described in the *Nuclear Posture Review*,
- supporting partnerships, collaborations and consortiums that provide resources and enhance research and education of minority students to develop the needed technical workforce for NNSA's laboratories and production plants,
- underpinning capabilities for annual assessment of the stockpile,
- developing capabilities needed for resolution of significant findings discovered through stockpile surveillance,
- advancing a sustainable dynamic plutonium experimental capability at the Nevada National Nuclear Security Site (NNSS), including advanced diagnostics through the ECSE effort to address potential reuse options and to qualify remanufacturing processes,
- executing hydrodynamic experiments to support advanced certification objectives in safety and security,
- enhancing the metallurgical understanding of the effects of plutonium aging and options for modern manufacturing processes,
- executing simulations and experiments and supporting simulations to inform the development of design options and facilitating capabilities for weapon secondaries,
- conducting experiments to assess manufacturing options for other nuclear explosive package components,
- developing predictive capabilities to assess U.S. weapon performance in hostile environments, and
- developing capabilities to support assessments of foreign state nuclear weapon activities.

The Science program will continue to leverage resources in ASC, Engineering, ICF, and DSW (especially the Plutonium Sustainment program).

FY 2015 Accomplishments
- Created W80-4 program pilot development plan and implemented system-scale electrical simulation tools for DSW applications.
- Completed a key deliverable for modeling, validation and uncertainty quantification of reentry random vibration, including models driving component vibration of the Mk5/W88 system.
- Fielded multiple hydrodynamic experimental series at the Dual-Axis Radiographic Hydrotest Facility (DARHT) supporting pit reuse, advanced surety concepts, and to assess the design and modeling for LEP certification readiness.
- Tested additively-manufactured components related to improving one-point safety for pit reuse designs and other new materials for the nuclear explosive package (NEP) to determine the feasibility of use in LEPs.

[a] The FY 2016 Consolidated Appropriations Act created the "Academic Alliances and Partnership" subprogram. This new subprogram includes the Academic Alliance Grants (previously funded within four of the Science program's subprograms) and the Minority Serving Institution Partnership Program (MSIPP) (previously funded within Site Stewardship).

- Conducted plutonium aging experiments involving new surface science capabilities and provided plutonium aging assessments for the AAR.
- Significantly advanced the understanding of the behaviors of plutonium in relevant weapon regimes through the conduct of plutonium experimental series at major NNSA scientific facilities including JASPER, Z, and NIF. Issued the first production, multiphase plutonium equation of state to designers guided by these experimental results as well as by previous plutonium experiments from gas guns and subcritical experiments at U1a.
- Enhanced Capabilities for Subcritical Experiments (ECSE) Work Breakdown Structure issued and Analysis of Alternatives initiated. ECSE is a national project to integrate diagnostic requirements (radiography and neutron diagnostics) with facility requirements to create a tool for future subcritical experiments.
- A collaboration of NSTec and LLNL extended the Optical Ranging diagnostic capabilities for use in hydrodynamic tests.
- Fielded the Lyra surrogate experiments at DARHT and U1a in preparation for the enhanced safety implosion subcritical experiment.
- Conducted the System 2 hydrodynamic experiment providing data on overdriven detonations in LX-14.
- Performed proton radiography (pRad) and small-scale experiments to validate codes for foreign weapon assessments and to measure the effects of convergence on IHE performance.

Science
Funding

(Dollars in Thousands)

	FY 2015 Enacted	FY 2015 Current	FY 2016 Enacted	FY 2017 Request	FY 2017 vs FY 2016
Research, Development, Test and Evaluation					
Science					
Advanced Certification	58,747	58,747	58,747	58,000	-747
Primary Assessment Technologies	109,000	109,000	95,512	99,000	+3,488
Dynamic Materials Properties	109,000	109,000	100,400	106,000	+5,600
Advanced Radiography	47,000	47,000	45,700	50,500	+4,800
Secondary Assessment Technologies	88,344	88,344	72,900	76,000	+3,100
Academic Alliances and Partnerships	0	0	49,800	52,484	+2,684
Total, Science	**412,091**	**412,091**	**423,059**	**441,984**	**+18,925**

Outyears for Science
Funding

(Dollars in Thousands)

	FY 2018 Request	FY 2019 Request	FY 2020 Request	FY 2021 Request
Research, Development, Test and Evaluation				
Science				
Advanced Certification	59,044	60,225	61,429	62,658
Primary Assessment Technologies	100,782	102,798	104,854	106,951
Dynamic Materials Properties	122,347	141,014	146,206	139,767
Advanced Radiography	77,155	77,817	78,520	58,537
Secondary Assessment Technologies	77,368	78,915	80,494	82,104
Academic Alliances and Partnerships	52,963	53,958	54,954	56,102
Total, Science	**489,659**	**514,727**	**526,457**	**506,119**

Science
Explanation of Major Changes
(Dollars in Thousands)

	FY 2017 vs FY 2016
Science	
Advanced Certification: Decrease reflects focus on planned level of Certification Readiness Exercises (CREs) for upcoming sustainment programs. CRE activities include assessment of pit reuse, IHE, advanced surety concepts, hardening options, structural integrity of weapon systems, and new technologies for potential use in future sustainment programs.	-747
Primary Assessment Technologies: Increase reflects support of: (1) design and analysis of hydrodynamic experiments and SCEs to support sustainment programs, (2) work on plutonium aging to support sustainment programs, (3) burn studies to support boost science, and (4) manufacturing technologies to engineer and fabricate plutonium parts for SCEs.	+3,488
Dynamic Materials Properties: Increase reflects support of: (1) the execution of two SCEs in support of upcoming sustainment programs and (2) work to characterize key materials including plutonium, AM materials, and new high explosive formulations.	+5,600
Advanced Radiography: Increase to support ECSE work.	+4,800
Secondary Assessment Technologies: Increase to support research in outputs, effects, and performance implications in hostile environments.	+3,100
Academic Alliances and Partnerships: Increase supports additional grants for basic science research relevant to the Stockpile Stewardship mission, consortium grants in STEM areas of interest to NNSA and DOE national laboratories, and development of peer to peer interactions among the Academic Alliances and Partnerships Programs.[a]	+2,684
Total, Science	**+18,925**

[a] The FY 2016 Consolidated Budget Act created the "Academic Alliances and Partnership" subprogram. This new subprogram includes the Academic Alliance Grants (previously funded within four of the Science program's subprograms) and the Minority Serving Institution Partnership Program (MSIPP) (previously funded within Site Stewardship).

Description

Advanced Certification is focused on facilitating certification of an evolving stockpile in the absence of nuclear testing; 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 aging phenomena 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, and (7) provide rapid response to emerging stockpile needs.

FY 2018-FY 2021 Key Milestones

- Conduct CREs on reuse designs, surety designs, hardening concepts, and designs incorporating new manufacturing technologies.
- Develop approaches to qualify primary initiation detonator systems.
- Develop, characterize, and test prototype NEP components made using AM methods, including NEP structural components, primary polymeric components, canned subassembly components, and radiation case components.
- Assess qualification path of new Y-12 manufacturing processes for components in support of future stockpile work.
- Perform integral hydrodynamic tests to assess options for improvement of surety design in sustainment programs, validate the Scaling and Surrogacy methodology, and study characteristics of historical primary anomalies.
- Design and support high energy density (HED) experiments to support primary and secondary performance related to assessment and certification activities of upcoming sustainment programs.
- Conduct focused experiments in support of development and maturation of product-based certification methods.
- Provide capabilities for product-based certification that facilitate qualification of components made with advanced manufacturing.
- Conduct assessments of comparable nuclear tests, studies of failure modes, and other advanced methods to facilitate their use in certification of upcoming sustainment programs.
- Continue studies supporting understanding of scaling and surrogacy to support the experimental basis for weapon assessments.
- Conduct experiments and analyses needed to qualify advanced surety technologies for future stockpile application.

Activities and Explanation of Changes

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs FY 2016
Advanced Certification $58,747,000 • Assess feasibility of incorporating new technologies into future sustainment programs (AM materials). • Initiate assessment of hardening concepts. • Explore the integrity of structural components made using AM techniques. • Mature surety concepts and mechanism for reuse and remanufacturing design options. • Perform work associated with scaling and surrogacy to enhance primary certification methodology. • Implement improvements in quantifications of margins and uncertainty metrics into assessment tools. • Develop plan for product-based certification methods for components and systems. • Execute experiments and complete analyses supporting evaluation of pit reuse designs, and assess the preliminary plans in support of reuse that are driving diagnostic investments in the out years. • Develop certification techniques proposed in the 2015 PFCF pegpost. • Increase the certification readiness level of various NEP components, including those made with AM. • Continue assessment of certification methods for replacing canned subassembly (CSA) components.	**Advanced Certification $58,000,000** • Complete Certification Readiness Exercises (CREs) for sustainment options including pit reuse, IHE designs, and designs with newly manufactured materials (including AM). • Execute hydrodynamic experiments to obtain data to support CREs for upcoming sustainment options. • Continue 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. • Demonstrate the certification potential of components made from AM processes. • Complete experiments and analysis to characterize the high-pressure behavior of a key material.	**Advanced Certification -$747,000** • Decrease reflects planned level of Certification Readiness Exercises, both to assess key needs for upcoming sustainment programs and to exercise the technical readiness and critical skills of weapon designers. • Increase in the number of hydrodynamic experiments supporting various complex options for upcoming sustainment programs, and for future sustainment options. • Mature work on incorporating AM components and components made with other advanced manufacturing techniques into the future stockpile.

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 principal focus of Primary Assessment Technologies in the out years 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). Primary Assessment Technologies also provides science capabilities needed for intelligence community assessments of foreign-state nuclear weapon activities.

FY 2018-FY 2021 Key Milestones

- Provide tools and methods for predicting primary lifetimes that account for initial production defects.
- Conduct HED experiments to measure properties of burning plasmas relevant for weapon operation.
- Continue to provide the ability to resolve SFIs associated with observations made by modern surveillance tools.
- Provide the science base that facilitates maturation and certification of future sustainment options associated with primaries.
- Develop updated assessment of plutonium aging based on new, experimental data.
- Conduct experiments and analyses to resolve principal remaining uncertainties associated with boost. This will facilitate confident assessment of weapons performance in regimes that differ from those tested either because of aging, changes in manufacturing processes, or changes in design.
- Complete predictive capability framework (PCF) milestone on boost to resolve key uncertainties in stockpile assessment.
- Conduct experiments and analyses to address nuclear physics parameter uncertainties.
- Expand weapon science capabilities to strengthen intelligence community assessments of specific foreign state nuclear weapon activities. Develop modern capabilities for the science-based Stockpile Stewardship Program (SSP) appropriate and suitable for use by the counter terrorism and counter proliferation program mission.
- Develop a comprehensive understanding (e.g., kinetics, surface morphology) of the corrosion process on actinide materials.

Activities and Explanation of Changes

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs FY 2016
Primary Assessment Technologies $95,512,000	**Primary Assessment Technologies $99,000,000**	**Primary Assessment Technologies +$3,488,000**
• Complete (HED) experiments providing data on the behavior of materials in extreme regimes relevant for stockpile primaries. • Complete high explosive experiments resolving key boost uncertainties. • Complete precision measurements for one aspect of fission properties of plutonium to improve the understanding of weapon criticality.	• 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. • In collaboration with Plutonium Sustainment, begin the engineering and fabrication of plutonium parts for upcoming SCEs.	• Increase support for ECSE to obtain data on plutonium from future SCEs at a resolution to inform modern weapon codes of stockpile performance. • Increase support for burn studies and boost experiments to resolve outstanding issues of primary performance. • Provides support for plutonium aging experiments needed for the B61 LEP. • Increase support for the engineering and fabrication of plutonium parts for SCEs (in collaboration with Plutonium Sustainment).

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 also are 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 IHE, polymers, and foams to address future design options 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, 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. 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. 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. 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.

FY 2018-FY 2021 Key Milestones

- Deliver high pressure plutonium data using the JASPER capability at NNSS.
- Develop advanced platforms for high-pressure materials measurements on the Z-machine.
- Support subcritical experiments at NNSS in support of upcoming sustainment programs, pit-reuse options, evaluating the effects of aging on performance, and annual assessment.
- Develop and field advanced diagnostics for equation-of-state, strength and damage, and hydrodynamic and subcritical experiments, in particular, Multiplexed PDV advances and pyrometry.
- In support of sustainment options, execute experiments providing key data at NNSA experimental facilities: JASPER, TA-55, LANSCE, the Z machine, HE firing sites, and other laboratory-scale science facilities.
- Support the testing and qualification of uranium, surrogates, high explosives, and other non-nuclear materials for remanufacturing options.
- Evaluate the dynamic response of materials produced by AM for potential stockpile applications.

Activities and Explanation of Changes

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs FY 2016
Dynamic Materials Properties $100,400,000	**Dynamic Materials Properties $106,000,000**	**Dynamic Materials Properties +$5,600,000**
• Continue acquisition of materials EOS, strength and damage data, applying complex loading, required for primary performance and pit reuse options. • Provide data to develop phase and process-aware materials models to simulate engineering, chemistry, and physics performance in extreme environments. • Evaluate IHE performance and safety in support of reuse options and advanced concepts. • Develop advanced diagnostics for fundamental, hydrodynamic, and subcritical experiments. • Deliver uranium, beryllium, surrogates, and non-nuclear materials data required for stockpile stewardship and SFI closure. • Develop advanced high-pressure capabilities for Pu at Z. • Continue Science experimental research at the LANSCE and Advanced Photon Source (APS) facilities. • Provide the conceptual design and diagnostics definition for future U1a subcritical experiments (SCE). • Prepare capabilities for future experiments with plutonium at U1a. • Execute a SCE for assessment of pit reuse options.	• Execute the Vega SCE (Lyra series) at U1a. • Execute Eurydice confirmatory experiment (Lyra series) at U1a. • 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.	• Increase supports the conduct of two subcritical experimental campaigns in FY 2017. • Increase supports additional plutonium work at the key science and HED facilities. • Increase supports assessment of AM materials for use in the future stockpile. • Increase supports high explosives work including the evaluation of new IHE formulations. • Increase supports the development of capabilities for production science.

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 experimental data. These capabilities are used to address SFIs and for technology assessment system certification for LEPs in the execution of sustainment programs. Advanced Radiography develops technologies and diagnostics that support experimental activities that are funded 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, Flash X-Ray (FXR) radiographic facility, Z pulsed power facility, Cygnus radiological source at the U1a Complex, Proton Radiography (pRad) at the Los Alamos Neutron Science Center (LANSCE), and Radiographic Integrated Test Strand (RITS) with supporting pulsed-power machines.

As outlined in the NNSA 2016 Stockpile Stewardship and Management Plan (SSMP), NNSA plans long-term investments supporting plutonium science at NNSS. The NNSS is the resource for experiments combining high explosives and plutonium and is recognized as a core capability for NNSA's science-based Stockpile Stewardship Program (SSP) in 50 U.S. C. § 2521.

It is the responsibility of the Science program to assess the effects of aging and manufacturing processes on proposed approaches to sustainment programs, SFIs, and other issues that affect the current and future stockpile. To fulfill these responsibilities in the absence of nuclear testing, research conducted by the Science program informs weapons assessment using hydrodynamic experiments with surrogate materials as well as with focused and integral subcritical experiments using plutonium. These experiments, combined with advanced theory, modeling, and simulation tools, underwrite the confidence in the nation's nuclear deterrent in the absence of nuclear testing and are critical to sustaining the stockpile.

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 an integrated facility that is capable of measuring the final stages of a subcritical primary implosion using plutonium. Although unnecessary for the last 25 years since the end of underground testing, recent Science efforts have advanced the understanding of plutonium in the early evolution of an imploding system and identified the need to investigate plutonium performance during the more extreme physical conditions reached at later times in the implosion. These key data will inform the discussion of various components of stockpile transformation. In addition, current weapon designers deem this capability important for the training and development of their successors. To fill this gap and to better diagnose this relevant regime, NNSA must enhance the capabilities for subcritical experiments at NNSS's underground laboratory, the U1a Complex. These capability enhancements are needed to support the program plan documented in the 2016 SSMP. This enhanced capability investment, also known as the Enhanced Capabilities for Subcritical Experiments (ECSE), is required in the FY 2015 through FY 2023 timeframe to meet critical milestones. The ECSE portfolio consists of a line item infrastructure project titled the U1a Complex Enhancements Project (UCEP), an advanced radiography machine that is funded as a Major Item of Equipment (MIE) titled Advanced Sources and Detectors, and a Neutron Diagnosed Subcritical Experiment (NDSE) capability.

FY 2018-FY 2021 Key Milestones

- Complete the Thor pulsed power research and development activities.
- Research and develop the next generation Z facility.
- Build the U1a Complex Enhancements Project (UCEP) Line Item Construction.
- Complete the ECSE radiographic system procurement and begin installation.
- Complete the Neutron Diagnosed Subcritical Experiment system procurement and begin installation.
- Procure and install the next generation DARHT and FXR cameras.
- Procure and install the next generation proton radiography cameras.
- Modernize radiographic analysis techniques and models.

- Advance and field hydrodynamic diagnostics for both surrogate and plutonium experiments.

Activities and Explanation of Changes

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs FY 2016
Advanced Radiography $45,700,000	**Advanced Radiography $50,500,000**	**Advanced Radiography +$4,800,000**
• Replace the aging DARHT camera system on its scheduled maintenance cycle. • Continue development of enhanced capabilities supporting future phases of deployment in the U1a Complex beyond the future-years-nuclear-security program. • Replace the FXR injector system and accelerator cells on scheduled replacement cycle. • Continue Linear Transformer Driver multi-purpose mission R&D. • Replace detector and scintillator technology at multiple NNSA facilities.	• Execute experiments to develop 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.	• Increase supports the development of ECSE portfolio for diagnostic system requirement to be used on future plutonium SCEs at U1a. • Change radiographic system research and development investments from next generation single pulse systems to multi-pulse systems.

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. 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 for physics performance of remanufactured CSA components. Improved predictive capability for secondary performance will be delivered as a level-1 milestone in FY 2019. Secondary Assessment Technologies will develop predictive capabilities to quantify weapon outputs and interaction with the environment for both stockpile systems and non-stockpile systems and to determine the performance implications of U.S. weapon systems in hostile environments. Secondary Assessment Technologies has strong programmatic coupling with other subprograms within Science and the HED facilities supported by both the Science and Inertial Confinement Fusion (ICF) Ignition and High Yield programs, including the National Ignition Facility (NIF), Omega Laser Facility at the University of Rochester, and the Z-Machine at Sandia National Laboratories, and significant coupling to advanced computing platforms supported by the ASC Program and with the Nuclear Survivability subprogram in the Engineering program.

Key Secondary Assessment Technologies work in FY 2017 is focused on weapon outputs, effects, and U.S. weapon performance in a hostile environment. The survivability of U.S. nuclear weapons in a hostile environment including a possible fratricide situation is an area of study gaining importance due to the U.S. abrogation of the Anti-Ballistic Missile treaty that had limited defenses between the U.S. and the Soviet Union/Russia. In order to understand survivability in a hostile environment, Secondary Assessment Technologies will conduct efforts to understand the weapon outputs (Red and Blue), their propagation of outputs, and how the subsequent effects couple into the weapon intended to survive, and how the performance of the weapon is impacted. This research includes obtaining experimental data for weapon design code validation for more accurate weapon output calculations; developing scientific and engineering models to understand radiation effects; improving laboratory radiation sources and diagnostics to support code validation and hardware qualification experiments; and evaluating candidate and evolving stockpile technologies for radiation hardness capabilities in a generalized, weapon-relevant configuration.

FY 2018-FY 2021 Key Milestones

- Incorporate validated and verified ultraviolet/visible/infrared (UV/VIS/IR) output calculations in codes and include those outputs in the eRedbook and eBluebook.
- Develop a warm x-ray source to explore future weapon sustainment options.
- Develop a strategic plan and execute the program plan to deliver full system output modeling capabilities.
- Continue to recruit, develop, and retain stockpile stewards, maintaining the technical superiority in the nation's nuclear security interest.
- Execute program plans associated with secondary capabilities and design options consistent with the sustainment program schedule.
- Develop and execute plans for 2019 Secondary Performance pegpost, delivering an advanced predictive capability for secondary performance in nominal and off nominal conditions.
- Develop physics-based models for key secondary-relevant issues that include SFI's, sustainment program and the Annual Assessment Report; and validate through HED and other experimental efforts and platform developments to obtain necessary experimental data.
- Calculate and compile Bluebook output data in the eBluebook and calculate the historical outputs based on UGTs; compare against historical measurements.
- Develop capabilities to assess U.S. weapon performance in hostile environments.

Activities and Explanation of Changes

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs FY 2016
Secondary Assessment Technologies $72,900,000	**Secondary Assessment Technologies $76,000,000**	**Secondary Assessment Technologies +$3,100,000**
• Complete the "Secondary LEP Capability" Predictive Capability Framework (PCF) pegpost for FY 2016, delivering design options and enabling capabilities for stockpile evolution of secondaries. • Develop strategic plan and execute program plan to deliver full system output modeling capabilities that includes experimental platform development. • Continue to recruit, develop, and retain stockpile stewards, maintaining the technical superiority in the nation's nuclear security interest. • Execute program plans associated with secondary capabilities and design options consistent with the sustainment program schedule. • Develop and execute plans for 2019 Secondary Performance pegpost, delivering an advanced predictive capability for secondary performance in nominal and off nominal conditions. • Develop physics-based models for key secondary-relevant issues that include SFI's, sustainment programs and the Annual Assessment Report; and validate through HED and other experimental efforts and platform development to obtain necessary experimental data. • Complete the transition to the Stanford Synchroton Radiation Lightsource (SSRL) from Brookhaven National Laboratory for an HED diagnostic calibration capability. • Establish a formal plan to incorporate UV/VIS/IR into output codes. • Deliver further Bluebook output data and historical outputs based on UGTs.	• Mature efforts to understand weapon outputs, effects, and performance in a hostile environment. • Execute NIF opacity experiments with iron and continue the Z opacity experimental series. • Assess initial conditions of weapon secondaries and compare with performance models. • Add 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. • Complete beam line transition activities at SSRL. Develop new calibration methods, sources, and diagnostics to support HED experiments at NIF, Omega, and Z. • Continue to recruit, develop, and retain stockpile stewards, maintaining the technical superiority in the nation's nuclear security interest. • Mature and execute plans for the 2019 Secondary Performance pegpost, delivering an advanced predictive capability for secondary performance in nominal and off-nominal conditions. • Further development of warm x-ray sources.	• Increase supports focused efforts 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 experimental program at HED facilities to include opacity and high-Z experiments at NIF.

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs FY 2016
• Continue to develop warm x-ray sources. • Continue physics studies relevant to weapons performance and outputs, including cross sections, opacities, etc.		

Description

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

(Dollars in Thousands)

Budget Category	FY 2016 Request	FY 2016 Omnibus	FY 2017 Request
Science: funding requested for SSAA within subprograms			
Primary Assessment Technologies	9,442	0	0
Dynamic Materials Properties	8,611	0	0
Advanced Radiography	1,311	0	0
Secondary Assessment Technologies	11,536	0	0
Site Stewardship			
Minority Serving Institution Partnership Program	19,085	0	0
Science			
Academic Alliances and Partnerships	0	49,800	52,484
TOTAL	**49,985**	**49,800**	**52,484**

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) Grants and Cooperative Agreements, and (2) Minority Serving Institutions Partnership Program (MSIPP).

The SSAA Grants and Cooperative Agreements 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 science, technology, engineering and math (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).

FY 2018-FY 2021 Key Milestones

- Provide advanced experimental measurement techniques in areas of Condensed Matter Physics and Materials Science, Hydrodynamics, Fluid Dynamics, Low-Energy Nuclear Science, and Radiochemistry via the SSAA program.
- Provide opportunities for intellectual challenge and collaboration by promoting scientific interactions between the academic community and scientists at the NNSA laboratories, via the SSAA program.
- Increase availability of unique experimental facilities sited at NNSA laboratories to the broader academic community, particularly for collaborations in areas of relevance to Stockpile Stewardship.
- Develop and maintain a long-term, recruiting pipeline to NNSA laboratories by increasing visibility of NNSA scientific activities to U.S. faculty and student communities.
- Pursue consortium based STEM grants that specifically target TCU's that provide TCU's the opportunity to build their STEM capacity and academic infrastructure in STEM. As a result TCUs will be in a sound position to become an intricate part of a STEM pipeline that addresses the STEM needs of the Tribal community.
- Confirm the hiring of various students into the NNSA/DOE and Federal workforce that have matriculated through various STEM consortium pipelines.
- Partner with other Federal agencies specifically NASA to broaden the reach of our MSIPP and to co-fund various minority STEM projects that are of mutual interest to the partnering agencies.
- Continue to strengthen and expand the MSI program through the five-year cybersecurity consortium investment between the HBCUs, Charleston County School District and the NNSA/DOE laboratories.

Activities and Explanation of Changes

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs FY 2016
Academic Alliances and Partnerships $49,800,000	**Academic Alliances and Partnerships $52,484,000**	**Academic Alliances and Partnerships +$2,684,000**
• Massie Chairs, HBCU, HSI, TCU, and community-based grants, and MSIPP consortium based model focus research and internships on DOE science, engineering, and internships; building educational/institutional infrastructure, and enhancing the pipeline of diverse, high quality talent in STEM academic disciplines and careers. • Continue support for Cyber Security consortium and competitive solicitation of the Massie Chairs Program. • Support the Stewardship Science Academic Alliance (SSAA) Grants and Cooperative Agreements program.	• 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 Grants and Cooperative Agreements program. • Increase emphasis in advanced experimental measurement techniques supportive of NNSA's core mission areas.	• Increase supports additional grants for basic science research relevant to the Stockpile Stewardship mission, consortium grants in STEM areas of interest to NNSA and DOE national laboratories, and development of peer to peer interactions among the Academic Alliances and Partnerships programs.

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 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021
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	80 % of progress	84 % of progress	N/A	N/A	N/A	N/A	N/A
Result	80						
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 ICF.						
Science-Based Capabilities - Provide the science-based capabilities necessary to support stockpile certification on an annual basis.							
Target	N/A	N/A	100% of progress	100% of progress	100% of progress	100% of progress	100% of progress
Result	N/A						
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

(Dollars in Thousands)

	Total	Prior Years	FY 2015 Enacted	FY 2015 Current	FY 2016 Enacted	FY 2017 Request	FY 2017 vs FY 2016 Request
Capital Operating Expenses Summary (including (Major Items of Equipment (MIE)							
Capital Equipment >$500K (including MIE)	N/A	N/A	15,200	15,200	4,395	11,992	+7,597
Plant Projects (GPP) (<$10M)	N/A	N/A	0	0	0	0	0
Total, Capital Operating Expenses	**N/A**	**N/A**	**15,200**	**15,200**	**4,395**	**11,992**	**+7,597**
Capital Equipment > $500K (including MIE)							
Total Non-MIE Capital Equipment (>$500K)	N/A	N/A	4,300	4,300	4,395	4,492	+97
Advanced Sources and Detectors, NNSS	184,000	0	10,500	10,500	0	7,500	+7,500
TA-53 pRad, LANL	4,714	3,714	400	400	0	0	0
Total, Capital Equipment (including MIE)	**N/A**	**N/A**	**15,200**	**15,200**	**4,395**	**11,992**	**+7,597**
Plant Projects (GPP and IGPP) (Total Estimated Cost (TEC) <$10M)							
Total Plant Projects (GPP) (Total Estimated Cost (TEC) <$5M)	N/A	N/A	0	0	0	0	0
Total, Plant Projects (GPP) (Total Estimated Cost (TEC) <$10M)	N/A	N/A	**0**	**0**	**0**	**0**	**0**
Total, Capital Summary	**N/A**	**N/A**	**15,200**	**15,200**	**4,395**	**11,992**	**+7,597**

Outyears for Science

(Dollars in Thousands)

	FY 2018 Request	FY 2019 Request	FY 2020 Request	FY 2021 Request
Capital Operating Expenses Summary (including (Major Items of Equipment (MIE)				
Capital Equipment >$500K (including MIE)	41,003	45,100	45,168	25,738
Plant Projects (GPP) (<$10M)	0	0	0	0
Total, Capital Operating Expenses	**41,003**	**45,100**	**45,168**	**25,738**
Capital Equipment > $500K (including MIE)				
Total Non-MIE Capital Equipment (>$500K)	3,003	3,100	3,168	3,238
Advanced Sources and Detectors, NNSS	38,000	42,000	42,000	22,500
Total, Capital Equipment (including MIE)	**41,003**	**45,100**	**45,168**	**25,738**
Plant Projects (GPP) (Total Estimated Cost (TEC) <$10M)				
Total Plant Projects (GPP) (Total Estimated Cost (TEC) <$5M)	0	0	0	0
Total, Plant Projects (GPP) (Total Estimated Cost (TEC) <$10M)	**0**	**0**	**0**	**0**
Total, Capital Summary	**41,003**	**45,100**	**45,168**	**25,738**

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;
- Increasing 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, and
- Mature technological enhanced development that both minimize probability of unauthorized use and maximize reliability for authorize use.

The Engineering Program is comprised of four subprograms:

1. **Enhanced Surety:** Develops state-of-the-art technologies leading to advanced safety, security, use-control, and integrated surety solutions for approved insertion into stockpile weapon systems, and explores visionary leading-edge technologies for these purposes. Enhanced Surety develops and matures viable technology insertion options that improves safety, security, and use control.

2. **Weapons Systems Engineering Assessment Technology (WSEAT):** Provides scientific understanding, experimental capability, diagnostic development to mature and qualified components and full weapon assemblies. WSEAT forms an essential link to weapon program qualification activities between engineering sciences, computational simulation, and system evaluation in normal and abnormal environments.

3. **Nuclear Survivability (NS):** Provides the tools and technologies necessary to design and qualify components and subsystems to meet requirements to withstand radiation, space, and other hostile environments. Nuclear Survivability develops radiation hardening-approaches and hardened components and supports an interagency Memorandum of Understanding to address performance response to threats.

4. **Enhanced Surveillance:** Contributes to weapon safety, performance and reliability by predicting or detecting precursors of age-related defects and provides engineering and physics-based estimates of component or system lifetimes based on the best available toolsets. The tools consist of science-based models of material, component, and subsystem diagnostic techniques that make the validation easier and less expensive to obtain. By investing in new non-destructive evaluation tools and techniques, Enhanced Surveillance both improves stockpile understanding and reduces need for destructive tests that burden stockpile production.

The Engineering Program employs a first user LEP model and provides for adaptation and application of these technologies to subsequent LEPs or more limited component upgrades. A first user LEP refers to the first LEP to use a technology or component that was developed or is being developed for multi-weapon-type use. The first user LEP subsumes the cost (e.g., the B61) for subsequent maturation of the technology for its particular requirements.

Highlights of the FY 2017 Budget Request

- Shift of priority emphasis to the immediate needs of the Directed Stockpile Work program.
- Test and evaluate technologies for multi-venue Integrated Surety Solution implementation for Air Force systems.
- Continue development of new concepts in Stronglinks, weaklinks, firing systems, and high explosive initiation systems to improve nuclear detonation safety.
- Release validation data on required weapon systems internal and external intrinsic radiation environments.
- Complete radiation effects environmental testing for the B61-12.
- Investigate non-nuclear survivability options and capabilities with the Department of Defense (DOD) and the Atomic Weapons Establishment (AWE).
- Initial design and development of the trusted strategic radiation-hardened microelectronics capability.

FY 2015 Accomplishments

Enhanced Surety:

- Demonstrate Integrated Surety Architecture (ISA) concepts in support of U.S. transportation enhancements. In addition, initial integration of components from AWE, SNL and LANL into a joint U.S. and U.K. ISA demonstration testbed was performed at the AWE and will continue to be in use during the planning period.
- Enhance Colaboration-12, Phase III (U.S. and U.K.) final planning and execution startup continued during the planning period.
- State Initiation Generator (STINGER) advanced switch development successfully completed six months ahead of schedule culminating in a first prototype assembly that will be deployed during the planning period.
- Continue use of the recently developed and demonstrated enhanced version of the Joint Integrated Lifecycle Surety (JILS) tool with prototype-graphing techniques for Insider and Cyber-attacks.

Weapons System Engineering Assessment Technology:

- Conducted heavily confined hi-fidelity cook-off testing that assessed the violence reaction of PBX-9502 under realistic and extreme confinement in abnormal thermal environments. (Los Alamos National Laboratory (LANL))
- Completed Livermore Explosive (LX-21) characterization and compatibility study. (Lawrence Livermore National Laboratory (LLNL))
- Conducted thermal and mechanical experiments on insensitive high explosives (IHE) and cellular silicone foams in support of constitutive model development. (LLNL)
- Obtained a data set for the response of an aerodynamic store to aero-acoustic loading in a model weapons bay having geometric complexities representative of those in flight. (Sandia National Laboratories - SNL)
- Provided consolidated laser weld model validation data set at ambient temperatures. (SNL)
- Demonstrate 3D kinematic measurements on a weapon component in a shock vibration environment. (SNL)

Nuclear Survivability:

- Produced a mesh representation of the B61-4 nuclear explosive package that can be used by radiation transport analysts in simulation modeling platforms to conduct intrinsic radiation (InRad) modeling analysis. (LANL)
- Provided environment and test platform to create and measure x-ray-driven system-generated electromagnetic pulse (SGEMP) currents in one- and two-dimensional test objects. (LLNL)
- Conducted impulse testing at Z Machine and Gamble II to compare response of materials previously tested in underground nuclear tests. (SNL)
- Demonstrated initial operational capability for a higher fidelity radiation source with a Reflex Triode on Saturn. (SNL)

Enhanced Surveillance:

- Completed the annual Enhanced Surveillance Stockpile Aging and Lifetime Assessment Report in support of the annual assessment process. (LANL, LLNL, SNL);
- Completed next series of Neutron Imaging experiments using the Los Alamos Neutron Sciences Center (LANSCE) (LANL)
- Advanced the Canned Subassembly response model development. (LANL)
- Completed artificial aging experiments of reuse materials for the B61 LEP. (LANL)
- Updated legacy material outgassing models. (LLNL)
- Qualified new silicone additively manufactured replacement porous silicone structures. (LLNL)
- Tested new scintillator for high resolution computed tomography diagnostic at Pantex. (LLNL)

- Completed follow-up activities for the B61 LEP including thermal battery materials aging and detonator material aging. (SNL)
- Delivered new automated weapon gas analysis capability to Pantex for prototype use. (SNL)
- Delivered new automated lifetime aging studies on organic and polymer materials. (National Security Complex (NSC) - KCP)
- Demonstrated functionality with fracture toughness test in pressurized vessel. (Savannah River)
- Developed, validated, and improved predictive capabilities and diagnostics to assess performance and lifetime for nuclear and non-nuclear materials. (Consolidated Nuclear Security (CNS) - Y-12)

Major Outyear Priorities and Assumptions

Outyear funding levels for the Engineering program total $583,839,000 for FY 2018 through FY 2021 and reflect programmatic requirements of the nuclear weapons stockpile. In particular, this includes the specific experiments, tests, and component maturation that support the enduring stockpile and other insertion opportunities that include Alterations, Modifications and LEPs. The Engineering Program priorities reflect continued efforts to assess and sustain the safety, security, reliability, and performance of the nuclear weapons stockpile.

This involves:

- Developing and maturing improved and viable technologies for both near and long terms insertion options to sustain nuclear weapon safety, security, and use control through the use of National Security requirements, JASON studies, and other NNSA Surety memos in conjunction with the JILS risk assessment capability;
- Developing advanced use-control and use denial technologies for Permissive Action Links, Active Protection, and Extended Protection Volume sub-systems and systems;
- Providing scientific understanding, computational, and experimental capability to develop and validate computational models and qualify weapon systems in normal and abnormal environments;
- Providing the tools and technologies needed to design and qualify components and subsystems to meet requirements for hostile environments; and maturing select predictive aging models and lifetime assessments.

Engineering
Funding

(Dollars in Thousands)

	FY 2015 Enacted	FY 2015 Current	FY 2016 Enacted	FY 2017 Request	FY 2017 vs FY 2016
Research, Development, Test and Evaluation					
Engineering					
Enhanced Surety	52,003	52,003	50,821	37,196	-13,625
Weapon Systems Engineering Assessment Technology	20,832	20,832	17,371	16,958	-413
Nuclear Survivability	25,371	25,371	24,461	43,105	+18,644
Enhanced Surveillance	37,799	37,799	38,724	42,228	+3,504
Total, Engineering	**136,005**	**136,005**	**131,377**	**139,487**	**+8,110**

Outyears for Engineering
Funding

(Dollars in Thousands)

	FY 2018 Request	FY 2019 Request	FY 2020 Request	FY 2021 Request
Research, Development, Test and Evaluation				
Engineering				
Enhanced Surety	44,412	45,757	44,072	44,241
Weapon Systems Engineering Assessment Technology	23,029	21,771	22,214	22,404
Nuclear Survivability	31,230	32,276	33,133	33,365
Enhanced Surveillance	45,147	46,226	47,186	47,376
Total, Engineering	**143,818**	**146,030**	**146,605**	**147,386**

Engineering
Explanation of Major Changes
(Dollars in Thousands)

	FY 2017 vs FY 2016
Engineering	
Enhanced Surety: The decrease will require a more concentrated focus, planned for additional funding in FY 2018, on primary base activities that will support the Technology Readiness Level (TRL) maturation goals established by the next insertion customer through detailed component development, material characterization, manufacturing, and subsystem integration activities. Technology maturation typically takes 7 to 10 years and lack of early investment negatively impacts costs, schedules, and risk; and reduces the range of options that can be investigated. We may be able to use uncosted balances to partially mitigate this decrease with other program trade-offs.	-13,625
Weapon Systems Engineering Assessment Technology: The decrease reduces support for diagnostic development of multi-environment assessment and characterization technologies and reduces support of QMU assessment through experimentation while continuing to support current LEPs and emerging W80-4 requirements This slight hiatus will respond to a pending 35% increase in FY 2018.	-413
Nuclear Survivability: The increase supports W80-4 modeling and experimentation of SGEMP in cavities and cables; cold and warm x-ray experimental platforms; and outputs modeling (Redbook and Bluebook). The increase also addresses the ability to establish required capabilities to assess survivability of current and future sustainment programs along with planning for potential non-nuclear survivability options. The increase also enhances international efforts through the Weapons Effects Strategic Collaboration and supports initial development of the trusted strategic radiation-hardened advanced microsystems capability and survivability related activities.	+18,644
Enhanced Surveillance: This increase sustains base capability support of ongoing multi-year aging studies, predictive modeling efforts, required deliverables for the B61-12 LEP and W88 Alt 370, and development of targeted non-destructive evaluation testing/diagnostics.	+3,504
Total, Engineering	**+8,110**

Engineering
Enhanced Surety

Description
The Enhanced Surety subprogram supports the President's vision that "*We must ensure that terrorists never acquire a nuclear weapon. This is the most immediate and extreme threat to global security.*" Enhanced Surety 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 maximum 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.
- Continuously creating and evolving highly advanced surety technologies, independent of specific weapon types or specific 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 O 452.1D, Nuclear Explosive and Weapon Surety Program, NNSA Defense Programs surety strategy, and JASON surety study findings and recommendations, in conjunction with the 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 in order to identify cost-effective stockpile surety enhancements.

FY 2018-FY 2021 Key Milestones
- Mature Multi-Point safety options.
- Complete transition of advanced stronglink from the Enhanced Surety subprogram to Directed Stockpile Work (DSW).
- Demonstrate the highest priority device by testing and evaluation, and mature its technology through TRL-5.
- Test, evaluate, and further mature technologies for multi-venue ISS implementation for Air Force systems.
- Improve understanding of material compatibilities.

[a] President Barack Obama Speech in Prague, Czech Republic, April 5, 2009.

Activities and Explanation of Changes

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs FY 2016
Enhanced Surety $50,821,000	**Enhanced Surety $37,196,000**	**Enhanced Surety -$13,625,000**
• Perform material compatibility and parametric studies on Multi-Point Safety (MPS) options. • Maturation, testing, and evaluation of the next generation highest priority device. • Test and evaluate technologies for multi-venue ISS implementation for Air Force systems.	• Perform material compatibility and parametric studies on MPS options at a reduced rate. • Focused, highly constrained advanced use control systems and use control technology development to address only highest priority needs. • Maturation, testing, and evaluation of the next generation highest priority device. • Test and evaluate technologies for multi-venue ISS implementation for Air Force systems.	• Reduction will require a concentrated focus on primary base activities to support the Technology Readiness Level (TRL) maturation goals established by the next insertion customer. This decrease will produce an increased risk to development of near term insertion options supporting both Air Force and Navy ballistic missile warheads.

Description

The Weapon Systems Engineering Assessment Technology (WSEAT) subprogram improves the physical understanding of weapon system and weapon component responses to environments. This includes all relevant stockpile-to-target sequence (STS) and manufacturing support service environments excluding nuclear and hostile electromagnetic environments explored in the Nuclear Survivability subprogram. 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 DSW. This subprogram focuses its resources on the immediate needs of DSW and ASC customers (e.g., current Alts and Mods; stockpile assessments; and open significant finding investigations (SFIs)).

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.

FY 2018-FY 2021 Key Milestones

- Validate test capability and instrumentation to quantify weather effect on re-entry body/re-entry 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 fuze performance qualification margins.
- Characterize Lightning Arrestor Connector (LAC) response to lightning for LAC qualification and predictive performance.
- Validate capability for stress state characterization of high explosive systems for 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.

Activities and Explanation of Changes

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs FY 2016
Weapon Systems Engineering Assessment Technology $17,371,000	**Weapon Systems Engineering Assessment Technology $16,958,000**	**Weapon Systems Engineering Assessment Technology -$413,000**
• Validate test capability and instrumentation to quantify weather effect on re-entry body/re-entry 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 fuze performance qualification margins. • Characterize Lightning Arrestor Connector (LAC) response to lightning for LAC qualification and predictive performance. • Validate capability for stress state characterization of high explosive systems for 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.	• Validate test capability and instrumentation to quantify weather effect on 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 fuze performance qualification margins. • Characterize 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. • Characterization of electromagnetic test facilities (EMSE, MSC and GTEM). • Characterization of dynamic brazing processes.	• The decrease reduces support for diagnostic development of multi-environment assessment and characterization technologies and reduces support of QMU assessment through experimentation while supporting current LEPs and emerging W80-4 requirement.

Engineering
Nuclear Survivability

Description

The modern analysis capabilities developed by the Nuclear Survivability (NS) subprogram 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, or component designs. Furthermore, the survivability of our nuclear weapons in a hostile environment including a possible fratricide situation is an area of study gaining importance due to U.S. abrogation of the Anti-Ballistic Missile (ABM) treaty that had limited defenses between the U.S. and the Soviet Union and Russia. 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.

The scope of the subprogram 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; and (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 Stockpile-to-Target-Sequence (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 – Creates 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.

FY 2018-FY 2021 Key Milestones

- Develop all experimentally validated modeling tools to incorporate outputs data, propagate the phenomena, and couple into the weapon in a self-consistent manner.
- Release validation data on required weapon systems (including B61-12) internal and external InRad environments.
- Complete delivery of validation of qualification-level device and circuit models for compound semiconductor HBT and silicon transfer technology.
- Collect experimental model validation data for opto-electronic technologies and deliver validation data for electro-optic device response models. Acquire single event effects data on relevant advanced technologies.
- Deliver radiation induced conductivity data on dielectrics in advanced electronics in support of model development.
- Deliver validation data on internal electromagnetic pulse (EMP) for simplified three-dimensional (3D) tests of boxed electronics.
- Update eRedbook with added suite of threat models and deliver eBluebook models for all stockpile weapons.

- Deliver cavity SGEMP validation data to probe peak-pressure response for a 3D test cavity relevant to future sustainment program studies and develop the modeling/simulation products.
- Experimentally validate impulse and blowoff models and apply them to evaluate composite materials. Plan experiments to fill in data gaps to deliver validation data for impulse generation models relevant to future LEP studies.
- Develop and experimentally validate thermal, blast, dust, and Source Region Electromagnetic Pulse (SREMP) models.
- Investigate non-nuclear survivability options for future sustainment programs.
- Complete a hostile environment test with Special Nuclear Material on the Annular Core Research Reactor (ACRR) to support the W80-4 or W78-1 LEP.

Activities and Explanation of Changes

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs FY 2016
Nuclear Survivability $24,461,000	**Nuclear Survivability $43,105,000**	**Nuclear Survivability +$18,644,000**
• Deliver validation data for qualification-level device and circuit models for compound semiconductor HBTs and circuits with Uncertainty Quantification. • Begin modeling and validation of silicon transistor devices. Release validation data on required weapon systems internal and external InRad environments. • Acquire single event effects (SEE) data on relevant advanced technologies. • Deliver validation data on internal EMP for simplified three-dimensional (3D) tests of boxed electronics. Scalable TID hardening techniques and evaluation of dose-rate upset in 180-nm silicon on insulator transistor technologies. • Collect experimental model validation data for opto-electronic technologies and deliver validation data for electro-optic device response models. • Deliver radiation induced conductivity data on dielectrics in advanced electronics in support of model development. • Complete radiation effects environmental testing for the B61-12. • Deliver cavity SGEMP validation data to probe peak-pressure response for a 3D test cavity relevant to future LEP studies. • Evaluate impulse models for composite materials and plan experiments to fill in data gaps to deliver validation data for impulse generation models relevant to future sustainment program studies.	• 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 (SNM) to support the W80-4 and/or the W78-1. • In cooperation with the Defense Threat Reduction Agency, deliver operational capability in SREMP/SGEMP to US Strategic Command in Cooperation with the Defense Threat Reduction Agency 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. • Incorporate ultraviolet/infrared spectrum into codes.	• The increase addresses required capabilities to assess survivability of current and future sustainment programs along with planning for potential non-nuclear survivability options. The increase also addresses the reprioritization of funding to complete the trusted strategic radiation-hardened advanced microsystems capability Analysis of Alternatives and begin conceptual design, preliminary hazard analysis, and integrated safety management planning of the follow-on capability to the current Silicon Fabrication capability at Sandia ($14M).

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs FY 2016
• Update eRedbook with added suite of threat models relevant to future sustainment program studies.		

Description

The Enhanced Surveillance (ES) subprogram contributes to weapon safety, performance and reliability by providing tools needed to predict or detect the precursors of age-related defects and provide engineering and physics-based estimates of component or system lifetimes. The ES tools consist of science-based models of material, component, and subsystem aging phenomena and advanced diagnostic techniques that provide data needed to validate these models. The effects of aging phenomena that could result in changes in weapon performance, safety, or reliability with respect to their requirements are subjected to rigorous assessments by responsible engineering and physics communities, and are reported annually. The requirements governing weapons include military characteristics (MCs), stockpile-to-target sequences (STSs), and interface control documents (ICDs). The lifetime predictions inform the annual stockpile assessment process with respect to the expected future state of each weapon system and, therefore, serve as inputs to the decision making process for scheduling weapon replacements or refurbishments. Additionally, ES develops tools and diagnostics that allow the examination of key pit features and early detection of defects as well as the assessment of aging effects and signatures.

Enhanced Surveillance activities include:

(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) CSA 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.

FY 2018-FY 2021 Key Milestones

- Complete an Enhanced Surveillance stockpile aging and lifetime assessment report to support the annual assessment process.
- Deploy next generation predictive capabilities for CSAs, cases, high explosives, detonators, non-nuclear components and materials to support assessment and certification.
- Implement new system-level capabilities and technologies pertaining to the health of the enduring stockpile.
- Deploy next suite of gas transfer system diagnostics for surveillance.
- Refine Component Material Evaluation (CME) activities for components in five component families.

Activities and Explanation of Changes

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs FY 2016
Enhanced Surveillance $38,724,000	**Enhanced Surveillance $42,228,000**	**Enhanced Surveillance +$3,504,000**
• Complete an Enhanced Surveillance stockpile aging and lifetime assessment report to support the annual assessment process. • Demonstrate a broad science-based CME program for predictive assessment and uncertainty quantification for selected components. • Complete initial aging and compatibility assessment of newly remanufactured TATB and LLM-105. • Conduct CME activities on a reduced, reprioritized set of component families. • Refine lifetime assessments across the nuclear explosive package materials and components for sustainment program use. • Develop and implement new diagnostics to study aging effects on legacy systems. • Refine aging models for stockpile silicon polymers, adhesives, and potting compounds.	• Complete an Enhanced Surveillance stockpile aging and lifetime assessment report to support the annual assessment process. • Demonstrate a broad science-based 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 SFIs. • 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.	• The increase sustains base capability support of ongoing multi-year aging studies, predictive modeling efforts, required deliverables for the B61-12 LEP and W88 Alt 370, and development of targeted non-destructive evaluation testing and diagnostics.

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 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021
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	22 deliverables	17 deliverables	13 deliverables	14 deliverables	12 deliverables	12 deliverables	12 deliverables
Result	22						
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 (DSW) nuclear weapons refurbishment and assessment activities.						

Engineering
Capital Summary

(Dollars in Thousands)

	Total	Prior Years	FY 2015 Enacted	FY 2015 Current	FY 2016 Enacted	FY 2017 Request	FY 2017 vs FY 2016 Request
Capital Operating Expenses Summary (including (Major Items of Equipment (MIE)							
Capital Equipment >$500K (including MIE)	N/A	N/A	2,841	2,841	2,904	2,968	+64
Plant Projects (GPP) (<$10M)	N/A	N/A	0	0	0	0	0
Total, Capital Operating Expenses	**N/A**	**N/A**	**2,841**	**2,841**	**2,904**	**2,968**	**+64**
Capital Equipment > $500K (including MIE)							
Total Non-MIE Capital Equipment (>$500K)	N/A	N/A	2,841	2,841	2,904	2,968	+64
Total, Capital Equipment (including MIE)	**N/A**	**N/A**	**2,841**	**2,841**	**2,904**	**2,968**	**+64**
Plant Projects (GPP and IGPP) (Total Estimated Cost (TEC) <$10M)							
Total Plant Projects (GPP) (Total Estimated Cost (TEC) <$5M)	N/A	N/A	0	0	0	0	0
Total, Plant Projects (GPP) (Total Estimated Cost (TEC) <$10M)	**N/A**	**N/A**	**0**	**0**	**0**	**0**	**0**
Total, Capital Summary	**N/A**	**N/A**	**2,841**	**2,841**	**2,904**	**2,968**	**+64**

Outyears for Engineering

(Dollars in Thousands)

	FY 2018 Request	FY 2019 Request	FY 2020 Request	FY 2021 Request
Capital Operating Expenses Summary (including (Major Items of Equipment (MIE)				
Capital Equipment >$500K (including MIE)	3,033	3,100	3,168	3,238
Plant Projects (GPP) (<$10M)	0	0	0	0
Total, Capital Operating Expenses	**3,033**	**3,100**	**3,168**	**3,238**
Capital Equipment > $500K (including MIE)				
Total Non-MIE Capital Equipment (>$500K)	3,033	3,100	3,168	3,238
Total, Capital Equipment (including MIE)	**3,033**	**3,100**	**3,168**	**3,238**
Plant Projects (GPP) (Total Estimated Cost (TEC) <$10M)				
Total Plant Projects (GPP) (Total Estimated Cost (TEC) <$5M)	0	0	0	0
Total, Plant Projects (GPP) (Total Estimated Cost (TEC) <$10M)	**0**	**0**	**0**	**0**
Total, Capital Summary	**3,033**	**3,100**	**3,168**	**3,238**

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 providing experimentally diagnosable capabilities in temperature and pressure regimes that are relevant to nuclear weapons. The overwhelming majority of the yield produced from a nuclear weapon is generated in the high energy density (HED) state. Therefore, expertise in the HED sciences is a core technical competency of the Stockpile Stewardship Program. The ICF program supports HED experiments and the operation of experimental facilities that generate weapon-relevant HED conditions (i.e., extreme pressures, temperatures, and densities that can only be realized in specialized laboratory environments). This requires the development of advanced experimental and computational tools including state-of-the-art laser and pulsed-power technologies to create robust and reliable thermonuclear burn platforms. A majority of ICF/HED experiments are performed at 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 (Omega) at the University of Rochester's Laboratory for Laser Energetics (LLE). The ICF Program includes contributions from the Naval Research Laboratory (NRL), Los Alamos National Laboratory (LANL), and industry partners (e.g., General Atomics and Schafer Corp.) as well as multiple academic institutions supported by the Joint Program in High Energy-Density Laboratory Plasmas with DOE's Office of Fusion Energy Sciences.

The ICF Program supports Stockpile Stewardship in several areas. Specifically, ICF/HED platforms are used for studying dynamic material properties, complex hydrodynamic processes, nuclear and plasma physics, thermonuclear burn and ignition, radiation transport and neutronics, opacities and radiation mean free paths, and the uses of yield such as weapon effects, forensics, and nuclear survivability. ICF coordinates closely with several other NNSA program elements, including the Science Program, Nuclear Survivability within the Engineering Program, and the Advanced Simulation and Computing (ASC) Program. High-level Program requirements are documented within the FY 2016 Stockpile Stewardship and Management Plan (SSMP).

"Non-ignition" HED activities:

- Challenging and developing nuclear designers in high energy-density regimes not otherwise accessible without nuclear weapons testing, and
- Elucidating material behaviors at extreme pressure, temperature, and density regimes presently inaccessible via other experimental techniques.

ICF Activities:

- Creating and diagnosing perturbations to thermonuclear burning plasmas;
- Developing high-fidelity diagnostics, advanced experimental platforms, and predictive capabilities and simulations, and
- Creating and applying multi-megajoule fusion yields, the ultimate deliverable of the ICF program.

Highlights of the FY 2017 Budget Request

Several recent accomplishments form the foundation of the FY 2017 ICF program Budget Request:

- 356 experiments were executed at the NIF in FY 2015, exceeding the goal of 300 data-acquiring shots. This achievement represents an increase of greater than 85% from the number of shots executed in FY 2014.
- Omega conducted its 25,000th target shot, achieving a significant milestone in its 45th year of operation.
- Record HED pressures were reached in plutonium and uranium experiments at SNL's Z Facility. Similar platforms were utilized to obtain groundbreaking data on material investigations of interest to the Defense Nuclear Nonproliferation's Nuclear Counterterrorism and Counter-Proliferation Program.
- At the NIF, LLNL acquired dynamic plutonium data at extreme pressures (millions of atmospheres) and high strain-rates that are otherwise inaccessible in the absence of nuclear testing.
- Record hot-spot pressures (factor of two larger than the previous record) were achieved using laser-driven direct-drive cryogenic targets at Omega.
- New platforms were developed at Omega to study the fundamental physics of laser-plasma interactions, improving understanding of ignition via lasers.
- Record neutron yields were achieved using the magnetic liner (MagLIF) fusion approach on the Z Facility, demonstrating a key technology integration milestone for pulsed power ICF. New warm x-ray sources that enabled

novel experiments to benchmark system-generated electromagnetic pulse (SGEMP) responses relevant to W88 ALT370 non-nuclear components qualification were developed for Z.

The FY 2017 ICF program builds upon these accomplishments 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 Strategy 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 2017 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 Stockpile Stewardship program requirements. The FY 2017 budget provides approximately $92,182,000 for the operation and utilization of the Z facility at SNL. This includes $50,520,000 within the ICF program and approximately $41,662,000 under the Science Program. The ICF budget provides $330,179,000 for the operations of the NIF for all users and the ICF Program at LLNL, and $63,830,000 for the operations of the Omega Laser Facility for all users as well as the ICF program at the University of Rochester.

At each HED facility the demand for facility use for both ignition and non-ignition activities typically exceeds the actual utilization time available by a factor of two. To better meet this demand at the NIF, a plan was executed in FY 2015 to increase the number of shots to 356, which corresponds to an 85% increase 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 June 2015, 62 of the 80 recommendations had been implemented. NNSA expects this shot rate to continue to improve in FY 2016 as the final recommendations are implemented. In FY2017, approximately 8% of NIF use time will be reserved for partnering with academic institutions to carry out science of mutual benefit to NNSA. Given this benefit, operational costs for these experiments are covered by NNSA (approximately $2.5 million).

Major Outyear Priorities and Assumptions

In FY 2015, the ICF Program developed a four element National ICF Program Framework that serves as the planning basis for outyear activities. The first element is the ten-year *HED Strategic Plan* that sets the highest level program requirements for the ICF and non-ignition HED science portfolios of the Stockpile Stewardship Program. This plan, published in January 2015, details efforts within the HED science portfolio with a near-term focus on developing and applying burn physics platforms for of the study of primary "boost" as part of the broader boost science effort coordinated across the Research, Development, Test, and Evaluation (RDT&E) program. Priorities in the latter part of the coming decade will shift from boost science to outputs, environments, and effects as HED platforms mature to meet evolving nuclear survivability requirements for stockpile modernization as described in the FY 2016 Stockpile Stewardship and Management Plan (SSMP). The ten-year HED Strategic Plan will be next updated in FY 2017.

The second element of the Framework is the *National Diagnostics Plan* published in February 2015. This plan, coordinated across multiple institutions, lays out the technical and resource requirements for eight transformative diagnostics (those that benefit multiple facilities), and a set of "local" diagnostics specifically tailored to one facility. These diagnostics are part of ongoing facility upgrades and are crucial to advancing the understanding of ICF implosions. Of particular interest are

spatially, spectrally, and temporally resolved imaging, spectroscopy, x-ray scattering and neutron diagnostics for the NIF, Z and Omega. The National Diagnostics Plan is updated on an annual basis.

Demonstrating ignition at the NIF remains a goal of the Stockpile Stewardship Program, along with improving the performance of implosions on the alternative approaches such as direct-drive at Omega and magnetic-drive at Z. The third element of the Framework is the *Integrated Experimental Campaigns Roadmap*, serving as the central coordination effort large body of work coordinated for NIF, Z and Omega with the specific purpose to improve performance of ICF implosions. Implosions designed for increased stability have resulted in experiments at the NIF that perform closer to code predictions while achieving record neutron yields with indications of significant alpha-deposition. Self-heating via alpha-deposition represents a significant technological gate on the way to ignition; thus, it is a necessary, but not a sufficient condition, to achieve ignition on the NIF. A coordinated effort between LLE and LLNL is in place to study symmetrically driven implosions at Omega with laser-plasma instabilities studied at the NIF of relevance to the pursuit of direct-drive ICF. Efforts in MagLIF at Z are in the early data-analysis phase with the first fully analyzed data set coming together in FY 2015 that may serve as a performance baseline. The Integrated Experimental Campaigns Roadmap is reviewed and updated on a bi-annual basis.

The fourth and final element of the Framework are the Priority Research Directions (PRDs) which serve as the coordinating vehicle for focused scientific efforts that provide the underpinning for the Integrated Experimental Campaigns. Over the next five years the ICF program will focus on several milestones related to the physics of implosion stagnation and burn onset that will be coordinated across each major ICF platform. The PRDs are aimed at closing longstanding gaps in the understanding of high-convergence ICF implosions, gaps that are fundamental to advancing yield performance of implosions using *any* ICF approach. Whereas the Integrated Experimental Campaigns Roadmap is focused on advancing overall implosion performance, the PRDs are focused on advancements in the basic understanding of hohlraum energetics and drive/radiation symmetry, hot-spot assembly initial conditions, plasma properties and stagnation physics at low, moderate, and high convergence. This stepwise physics-based approach of the PRDs requires National coordination to define, execute, and analyze data from experiments each of the three major HED facilities used in concert to advance understanding. A major planning activity in FY 2016 is to develop the first draft of the PRDs and to establish an update schedule for subsequent revisions.

The domain of the first element is the entire ICF program, or about $525 million annually. The diagnostics of the second element are a portion of the Diagnostics, Cryogenics, and Experimental Support subprogram (about a $65 million effort annually) and other subprograms. The financial domain of the third element, ICF, is substantially supported by the Facility Operations and Target production, Ignition, and inertial confinement fusion subprograms (about $425 million annually. The domain of the fourth element, the PRDs, again is ICF, so it's a different organizational framework for the ICF activities with a financial domain like the third element.

Outyear funding levels for the ICF program total $2,240,219,000 for FY 2018 through FY 2021. The outyear budget requests align to the Ten Year HED Strategic Vision and have been coordinated with funding requests from other elements of the RDT&E portfolio. If the funding elements change significantly, the ICF program will require adjustments of the baseline.

Inertial Confinement Fusion Ignition and High Yield
Funding

(Dollars in Thousands)

	FY 2015 Enacted	FY 2015 Current	FY 2016 Enacted	FY 2017 Request	FY 2017 vs FY 2016
Research, Development, Test and Evaluation					
Inertial Confinement Fusion Ignition and High Yield					
Ignition	77,994	77,994	76,334	75,432	-902
Support of Other Stockpile Programs	23,598	23,598	22,843	23,363	+520
Diagnostics, Cryogenics and Experimental Support	61,297	61,297	58,587	68,696	+10,109
Pulsed Power Inertial Confinement Fusion	5,024	5,024	4,963	5,616	+653
Joint Program in High Energy Density Laboratory Plasmas	9,100	9,100	8,900	9,492	+592
Facility Operations and Target Production	335,882	335,882	339,423	340,360	+937
Total, Inertial Confinement Fusion Ignition and High Yield	**512,895**	**512,895**	**511,050**	**522,959**	**+11,909**

Outyears for Inertial Confinement Fusion Ignition and High Yield
Funding

(Dollars in Thousands)

	FY 2018 Request	FY 2019 Request	FY 2020 Request	FY 2021 Request
Research, Development, Test and Evaluation				
Inertial Confinement Fusion Ignition and High Yield				
Ignition	79,575	83,350	86,421	86,421
Support of Other Stockpile Programs	23,565	23,565	27,765	27,765
Diagnostics, Cryogenics and Experimental Support	77,915	82,723	84,023	83,141
Pulsed Power Inertial Confinement Fusion	7,596	8,416	9,096	9,096
Joint Program in High Energy Density Laboratory Plasmas	9,492	9,492	9,492	9,492
Facility Operations and Target Production	346,791	349,347	352,840	352,840
Total, Inertial Confinement Fusion Ignition and High Yield	**544,934**	**556,893**	**569,637**	**568,755**

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

	FY 2017 vs FY 2016
Inertial Confinement Fusion Ignition and High Yield	
Ignition: Overall support decreases slightly, with continued strong research efforts in stagnation physics, efforts in wetted-foam and double-shell targets, support for research at NRL, analysis of data acquired on one-dimensional implosion on the NIF, and investigations of hohlraum energetics.	-902
Support of Other Stockpile Programs: The increase maintains strong ICF support of weapons physics HED research, consistent with the 10-year HED Strategic plan.	+520
Diagnostics, Cryogenics, and Experimental Support: The increase supports the National Diagnostics Strategy, a National ICF program effort to research, design, and deploy transformation diagnostics at all ICF/HED facilities.	+10,109
Pulsed Power Inertial Confinement Fusion: This funding increase will be used to sustain the effort to advance the science of magnetically-driven implosions.	+653
Joint Program in High Energy Density Laboratory Plasmas: This funding increase is maintained to support basic science research grants and to support development of critical skills in HED physics of relevance to the long-term success of Stockpile Stewardship program.	+592
Facility Operations and Target Production: The increase supports enhanced operations at the NIF and Z, and for research and development and advanced target designs and fabrication techniques.	+937
Total, Inertial Confinement Fusion Ignition and High Yield	**+11,909**

Inertial Confinement Fusion Ignition and High Yield
Ignition

Description

Platforms that may achieve thermonuclear burn onset, ignition, and ultimately multi-megajoule fusion yield at laboratory scale form a set of unique capabilities critical to the enduring Stockpile Stewardship Program as well as to the qualification of nuclear components and the assessment and certification of nuclear weapon modernization. This subprogram supports these capabilities through experiments, computation, design, applied research and development (R&D) and engineering, requirements for diagnostics, fielding experiments, and analyzing data. The near-term emphasis of this subprogram is to elucidate stagnation physics through a systematic study of implosions at low, moderate, and high convergences. The long-term goals include achieving significant yield to meet nuclear survivability requirements and using burning plasma outputs to reach previously inaccessible regimes relevant to nuclear weapons in the laboratory with unprecedented fidelity. The core requirements for this subprogram are described in the FY 2016 Stockpile Stewardship and Management Plan (SSMP), the Ten Year HED Strategic Plan, the National Diagnostics Strategy, and the Five-Year National ICF Program Roadmap.

The Science Program, Advanced Simulation and Computing (ASC) Program, Directed Stockpile Work (DSW), and other stockpile program elements rely on the capabilities developed by this subprogram to successfully execute the FY 2016 NNSA SSMP.

FY 2018-FY 2021 Key Milestones

- Execute the Five-Year ICF Roadmap for stagnation and burn physics including the study of one-dimensional (1D) implosion platforms on the NIF and Omega to study mix and hot-spot assembly initial conditions at low convergence, quantification and understanding both hohlraum energetics and radiation symmetry for indirect-drive platforms on the NIF and Z, plasma opacity and symmetry at moderate convergence at peak powers on Z and NIF, and stagnation physics at high convergence on NIF, Z and Omega.
- Assess efficacy of wetted foam targets as a 1D implosion platform to be used to investigate the effect of shape and convergence on ICF implosions, as well as the physics of hot spot formation.
- Develop an understanding of the interrelated roles of time-dependent symmetry, hydrodynamic instabilities and mix, and laser plasma instabilities and hot electron generation on the performance of ignition target designs.
- Determine effectiveness of Deuterium-Tritium (DT) wetted foams for direct drive.
- Explore alternate capsule mounting techniques on the NIF to avoid long length-scale hydrodynamic perturbations.

Activities and Explanation of Changes

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs FY 2016
Ignition $76,334,000	**Ignition $75,432,000**	**Ignition -$902,000**
• 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.	• Execute the Five-Year ICF Roadmap for stagnation and burn physics including: o The study of one-dimensional (1D) implosion platforms on the NIF and Omega facilities to study mix and hot-spot assembly initial conditions (ICs) at low convergence, o Elucidating hohlraum energetics and radiation symmetry for indirect-drive platforms on the NIF and Z facilities, o Plasma and radiation opacities and symmetry at moderate convergences and peak powers on the NIF and Z facilities, and o Stagnation physics at high convergence on the NIF, Z and Omega facilities. • Assess efficacy of wetted foam targets as 1D implosion platforms for investigating geometric convergence effects on ICF implosions and hot spot formations. • Elucidate correlations between time-dependent symmetries, hydrodynamic instabilities and mix, laser plasma instabilities, and effects of hot electron generation on ICF target performance. • Determine effectiveness of Deuterium-Tritium (DT) wetted foams for direct drive. • Explore alternate capsule mounting techniques on the NIF to minimize long length-scale hydrodynamic perturbations.	• The decrease still provides continued strong research efforts in stagnation physics, efforts in wetted-foam and double-shell targets, support for research at NRL, analysis of data acquired on one-dimensional implosion on the NIF, and investigations of hohlraum energetics.

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

Description

In the high energy-density (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 of significant relevance to nuclear weapons implosions/explosions and is a core component of the Stockpile Stewardship Program (SSP). Specifically, the areas supported in the Support of Other Stockpile Programs subprogram relevant to nuclear weapons include dynamic material properties, fluid and plasma hydrodynamics, low-energy nuclear physics, mix, burn, boost, radiation transport and opacities, and yield applications relevant to outputs, environments, and effects. In these areas, this subprogram supports R&D platforms and specialized diagnostics for the NIF, Omega, Z, and supporting facilities. This subprogram coordinates closely with subprogram elements within the Science program to develop and integrate the experimental infrastructure and capabilities required to execute experiments at HED/ICF facilities. The core requirements for this subprogram are described in the FY 2016 Stockpile Stewardship and Management Plan (SSMP), the Ten-Year HED Strategic Plan, and the National Diagnostics Strategy.

The Science Program, Advanced Simulation and Computing (ASC) Program, Directed Stockpile Work (DSW), and other stockpile program elements rely on the capabilities developed by this subprogram to successfully execute the collective NNSA Stockpile Stewardship and Management Plan.

FY 2018-FY 2021 Key Milestones

- In coordination with the Science program, continue implementation of 10-year HED Strategic Plan to support the requirements of the SSMP, including demonstrating an HED-coupled hydro-burn platform.
- Develop platforms for initial experiments to support the validation of opacity models.
- Demonstrate a deuterium-tritium burn platform that meets the needs of the SSP.
- Demonstrate new platform to acquire high-pressure materials data at high initial temperatures.
- Complete data collection and analysis for the high Atwood shear campaign on the NIF.
- Perform first-of-a-kind experiment to weapons physics using a double shell platform.
- Assess relative merits of Beryllium (Be) capsules, wetted foam capsules, and double shells for burning plasma experiments.

Activities and Explanation of Changes

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs FY 2016
Support of Other Stockpile Programs $22,843,000	**Support of Other Stockpile Programs $23,363,000**	**Support of Other Stockpile Programs +$520,000**
• 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.	• Execute 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. • Demonstrate a Deuterium-Tritium (DT) burn platform that meets the needs of the Stockpile Stewardship Program. • Demonstrate new platform to acquire high-pressure materials data at high initial temperatures. • Complete data collection and analysis for the high Atwood Number (At) shear campaign on the NIF. • Perform pioneering experiment for weapons physics using a double shell platform. • Assess relative merits of Beryllium (Be) capsules, wetted foam capsules, and double shells for burning plasma experiments.	• 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 Stockpile Stewardship Program. 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 extreme HED conditions present in nuclear detonations require concomitant investments in diagnostic and experimental capabilities. The Diagnostics, Cryogenics, and Experimental Support subprogram conducts the R&D for specialized technologies needed to execute and diagnose ICF/HED experiments encompassing laser- and pulsed power-based technology advancements. The subprogram is also responsible for the design and engineering of a complex array of diagnostic and measurement systems along with associated information technology subsystems for data acquisition and analyses. Support for this subprogram also covers the development and deployment of supporting equipment and technologies to facilitate a broad range of experimental requirements for applications to national security applications and discovery science applications relevant to programmatic deliverables. This subprogram provides general support for the deployment of technologies for the experimental study of matter under extreme HED conditions. The core requirements for this subprogram are described in the FY 2016 Stockpile Stewardship and Management Plan (SSMP), the Ten Year HED Strategic Plan, the National Diagnostics Strategy, and the Five Year National ICF Program Roadmap.

The Science program, Advanced Simulation and Computing (ASC) program, Directed Stockpile Work (DSW), and other stockpile program elements rely on the capabilities developed by this subprogram to successfully execute the collective FY 2016 NNSA Stockpile Stewardship and Management Program.

FY 2018-FY 2021 Key Milestones

- Develop and support diagnostic capabilities, cryogenic systems, user optics, laser and pulsed-power capabilities at NIF, Z and Omega, and other supporting facilities at a pace commensurate with program requirements.
- Implement and update the National Diagnostics Strategy.
- Research, develop, and deploy diagnostics and their associated analysis packages that can operate in harsh HED environments on NIF, Omega, and Z, including: (1) at least two line-of-sight high spatial and spectral resolution spectrometers on the NIF, and at least one on Z, and OMEGA EP; (2) optical Thomson scattering diagnostics on NIF; (3) the GCD-3 at NIF; and (4) a dual-sensor, multi-frame hybrid CMOS detector on Z, with a duplicate provided to the NIF.
- Commission a third axis of a neutron time-of-flight diagnostic on the NIF.

Activities and Explanation of Changes

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs FY 2016
Diagnostics, Cryogenics and Experimental Support $58,587,000	**Diagnostics, Cryogenics and Experimental Support $68,696,000**	**Diagnostics, Cryogenics and Experimental Support +$10,109,000**
• 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 time-resolved 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 Strategy. • Develop, advance, and implement diagnostics and associated analysis packages that can operate in challenging HED environments on NIF, Omega, and Z, including: o At a minimum two line-of-sight high spatial and spectral resolution spectrometers on the NIF, and one on the OMEGA and Z facilities, o Optical Thomson scattering diagnostics on the NIF, o The GCD-3 at the NIF, and o A dual-sensor, multi-frame hybrid CMOS detector on the Z facility, with a duplicate provided to the NIF. • Commission a third axis of a neutron time-of flight diagnostic on the NIF.	• The increase supports the progressive execution of the National Diagnostics Strategy with primary focus on efforts to develop, advance, and implement transformation diagnostics at ICF/HED facilities. • These improvements include: o The implementation of spectrometers with advanced spatial and spectral resolutions, o Optical Thomson-scattering diagnostics, in which elastic scattering of electromagnetic radiation by a free charged particles are investigated, and o Multi-frame hybrid detectors and neutron/radiation diagnostics.

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

Description

Pulsed Power Inertial Confinement Fusion (ICF) advances the science and technology associated with pulsed power-driven implosions and their platforms. This subprogram supports the Priority Research Directions for magnetically-driven ICF. It also supports a mixture of focused and integrated experiments to address key physics uncertainties in direct-drive approaches such as the magnetized liner (MagLIF), as well as X-ray driven platforms such as the double-ended and the dynamic hohlraum platforms. Support includes experimental design and simulation, research and development, requirements for diagnostics, experimental infrastructure (diagnostics and capabilities), and fielding experiments on pulsed-power platforms, and for analyzing experimental data. Improvement in the capabilities and tools used for pulsed-power ICF design is also supported. One objective of this subprogram is to determine the requirements for an advanced pulsed power driver capable of achieving high fusion yield. The core requirements for this subprogram are described in the Stockpile Stewardship and Management Plan (SSMP), the Ten Year HED Strategic Plan, the National Diagnostics Strategy, and the Five Year National ICF Program Roadmap.

The Science program, Advanced Simulation and Computing (ASC) program, Directed Stockpile Work (DSW), and other stockpile program elements rely on the capabilities developed by this subprogram to successfully execute the NNSA Stockpile Stewardship and Management Program.

FY 2018-FY 2021 Key Milestones

- Execute the 5-year ICF Roadmap for stagnation and burn physics including study of one-dimensional (1D) implosion platforms on the NIF and Omega to study mix and hot-spot assembly initial conditions at low convergence, quantification and understanding hohlraum energetics and radiation symmetry for indirect-drive platforms on the NIF and Z, plasma opacity and symmetry at moderate convergence at peak powers on Z and NIF, and stagnation physics at high convergence on NIF, Z and Omega.
- Complete scaling study of MagLIF concept exploring sensitivity to laser energy and magnetic field strength.
- Assess the stagnation of MagLIF target experiments and compare with simulations.
- Define requirements for and perform scoping studies of a pulsed power facility that can demonstrate robust ignition and multi-megajoule fusion yield.

Activities and Explanation of Changes

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs FY 2016
Pulsed Power Inertial Confinement Fusion $4,963,000	**Pulsed Power Inertial Confinement Fusion $5,616,000**	**Pulsed Power Inertial Confinement Fusion +$653,000**
• Evaluate, through small scale experiments, the mechanism by which Magneto Rayleigh Taylor instabilities are seeded in magnetically driven liner 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 pre-conditioning experiments on multiple NNSA laser facilities, and document a plan for depositing >4 kJ. • 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.	• Execute the Five Year ICF Roadmap for stagnation and burn physics including: o The study of one-dimensional (1D) implosion platforms on the NIF and Omega facilities to study mix and hot-spot assembly initial conditions (ICs) at low convergence, o Elucidating hohlraum energetics and radiation symmetry for indirect-drive platforms on the NIF and Z facilities, o Plasma and radiation opacities and symmetry at moderate convergences and peak powers on the NIF and Z facilities, and o Stagnation physics at high convergence on the NIF, Z and Omega facilities. • Complete scaling study of MagLIF concept exploring sensitivity to laser energy and magnetic field strength. • Assess the stagnation of MagLIF target experiments and compare with simulations. • Define requirements for and perform scoping studies of a pulsed power facility that can demonstrate robust ignition and multi-mega Joule fusion yield.	• The increase supports the execution of the Five-Year ICF Roadmap and efforts that will sustain efforts in advancing 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.

Inertial Confinement Fusion Ignition and High Yield
Joint Program in High Energy Density Laboratory Plasmas

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 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.

FY 2018-FY 2021 Key Milestones

- Provide research grants and cooperative agreements to fund individual investigators as well as research centers.

Joint Program in High Energy Density Laboratory Plasmas

Activities and Explanation of Changes

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 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**
• Continued support of High Energy Density Laboratory Plasma research through solicitations to fund individual investigator and research centers activities. Conducted solicitation for National Laser Users' Facility (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 National Laser Users' Facility (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 HEDLP program in FY 2017. 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 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, and the Z facility, the Trident facility at LANL, and the NIKE facility at the Naval Research Laboratory (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 Strategy, and the Five Year National ICF Program Roadmap.

The Science program, Advanced Simulation and Computing (ASC) program, Directed Stockpile Work (DSW), and other stockpile program elements rely on the capabilities developed by this subprogram to successfully execute the NNSA Stockpile Stewardship and Management Program.

FY 2018-FY 2021 Key Milestones

- Support similar level of facility operations as FY 2016 at NIF, Omega, Z, and Trident, with strong emphasis on highest priority experiments in support of the stockpile.
- Improve operational efficiency at every facility and in target fabrication.
- Conduct annual assessment of infrastructure and mission needs and recommend following fiscal year investments across each HED facility.
- Perform radiographic platform development experiments using the Advanced Radiographic Capability at NIF.

Activities and Explanation of Changes

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs FY 2016
Facility Operations and Target Production $339,423,000	**Facility Operations and Target Production $340,360,000**	**Facility Operations and Target Production +$937,000**
• 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 Z, operated 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, operated consistent with the governance plan and based on shot allocation guidance from the NNSA.	• Maintains facility operations at the NIF, Omega, Z, and Trident facilities. • 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.	• The increase supports continued maintenance and operations at the DOE HED facilities (i.e., NIF Omega, Z, Trident, and NIKE) as well as continued support for ICF capsule target design, engineering, and fabrication.

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 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021
Key Extreme Experiments - Cumulative percentage of progress towards achievement of key extreme experimental condition of matter needed for predictive capability for nuclear weapons performance.							
Target	100% of progress (cumulative)	N/A	N/A	N/A	N/A	N/A	N/A
Result	100						
Endpoint Target	By the end of FY 2015, achieve temperature and pressure conditions in the laboratory relevant to weapons' primaries. This activity is performed in collaboration with the Science program within the Office of Research and Development.						
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	10% of progress (cumulative)	20% of progress (cumulative)	30% of progress (cumulative)	40% of progress (cumulative)	50% of progress (cumulative)	60% of progress (cumulative)	70% of progress (cumulative)
Result	10						
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 2015 Enacted	FY 2015 Current	FY 2016 Enacted	FY 2017 Request	FY 2017 vs FY 2016 Request
Capital Operating Expenses Summary (including (Major Items of Equipment (MIE)							
Capital Equipment >$500K (including MIE)	N/A	N/A	4,850	4,850	4,957	5,006	+49
Plant Projects (GPP) (<$10M)	N/A	N/A	2,500	2,500	2,555	2,611	56
Total, Capital Operating Expenses	**N/A**	**N/A**	**7,350**	**7,350**	**7,512**	**7,617**	**+105**
Capital Equipment > $500K (including MIE)							
Total Non-MIE Capital Equipment (>$500K)	N/A	N/A	4,850	4,850	4,957	5,006	+49
Total, Capital Equipment (including MIE)	**N/A**	**N/A**	**4,850**	**4,850**	**4,957**	**5,006**	**+49**
Plant Projects (GPP and IGPP) (Total Estimated Cost (TEC) <$10M)							
Total Plant Projects (GPP) (Total Estimated Cost (TEC) <$5M)	N/A	N/A	2,500	2,500	2,555	2,611	+56
Total, Plant Projects (GPP) (Total Estimated Cost (TEC) <$10M)	N/A	N/A	**2,500**	**2,500**	**2,555**	**2,611**	**+56**
Total, Capital Summary	**N/A**	**N/A**	**7,350**	**7,350**	**7,512**	**7,617**	**+105**

Outyears for Inertial Confinement Fusion Ignition and High Yield

(Dollars in Thousands)

	FY 2018 Request	FY 2019 Request	FY 2020 Request	FY 2021 Request
Capital Operating Expenses Summary (including (Major Items of Equipment (MIE)				
Capital Equipment >$500K (including MIE)	5,177	5,291	5,407	5,526
Plant Projects (GPP) (<$10M)	2,668	2,727	2,787	2,848
Total, Capital Operating Expenses	**7,845**	**8,018**	**8,194**	**8,374**
Capital Equipment > $500K (including MIE)				
Total Non-MIE Capital Equipment (>$500K)	5,177	5,291	5,407	5,526
Total, Capital Equipment (including MIE)	**5,177**	**5,291**	**5,407**	**5,526**
Plant Projects (GPP) (Total Estimated Cost (TEC) <$10M)				
Total Plant Projects (GPP) (Total Estimated Cost (TEC) <$5M)	2,668	2,727	2,787	2,848
Total, Plant Projects (GPP) (Total Estimated Cost (TEC) <$10M)	**2,668**	**2,727**	**2,787**	**2,848**
Total, Capital Summary	**7,845**	**8,018**	**8,194**	**8,374**

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 stockpile assessment supporting Annual Assessment and future sustainment program certification of the stockpile, and is an integrating element of the Predictive Capability Framework, as described in the FY 2016 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, for the most part, 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. Recently, the ASC capabilities were invoked to support the National Strategic Computing Initiative (NSCI), as directed by Presidential Executive Order dated 29 July 2015, and budget resources were increased to support the NSCI. The NSCI is a whole-of-government effort designed to create a cohesive, multi-agency strategic vision and Federal investment strategy, executed in collaboration with industry and academia, to maximize the benefits of high performance computing (HPC) for the United States.

The FY 2017 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).
- Provide capabilities for weapons designers to complete ASC nuclear-performance baseline models for each stockpile weapon systems.
- 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.
- Improve methods to quantify uncertainty and overcome current limitations and enhance utility for design, qualification, and certification.
- Influence and respond to rapid technological changes in computing industry.

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 $663,184,000 in FY 2017, a $40,178,000 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 co-design work with industry to support the NSCI. These capabilities are necessary to inform the annual assessment of the nuclear stockpile. Included in this Budget Request is $95,000,000 for activities and research leading to deployment of exascale capability for national security applications in the early 2020's.

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 function. 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 HPC resources more effectively.

The global shift in fundamental computing architecture under the NSCI is an increasingly urgent driver for simulation and computing investment. 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 (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. To address this, 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, Advanced Scientific Computing Research, (ASCR) program in the development and oversight of the Department's Exascale Computing Project.

Highlights of the FY 2017 Budget Request

- Establish the National Strategic Computing Initiative, as a directed by Presidential Executive Order dated 29 July 2015, and is supported by this Budget Request.
- Lay the groundwork to deliver the ASC Trinity (LANL) and Sierra (LLNL) systems.
- Preserve the current integrated design codes.
- Prepare the current ASC facilities, national laboratory computing centers, for the next-generation platforms.

Major Out-year Priorities and Assumptions

Out-year funding levels for the ASC program total $2,781,693,000 for FY 2018 through FY 2021.

Out-year priorities and assumptions are governed by the mission to provide high-end simulation capabilities needed to meet weapons assessment and certification requirements. The major assumption is that funding for the ASC program will suffice to support the sustainment program schedules (as approved by the Nuclear Weapons Council) through 2030. In this time frame, ASC-supported modeling and simulation capabilities will contribute to current and future LEP's and studies, including the B61 LEP, W78/88-1 LEP study, application of re-use methods and technologies leading to increased confidence in the U.S. deterrent.

The ATDM level of investment increases to $95,000,000 annually in FY 2017 through FY 2021. This level of funding strives to create a solid foundation of technology to support the national nuclear security mission and enables progress on the most pressing challenges.

FY 2015 Accomplishments

- Created W80-4 program pilot development plan and implemented system-scale electrical simulation tools for DSW applications.
- Completed a key deliverable for modeling, validation and uncertainty quantification of reentry random vibration, including models driving component vibration of the Mk5/W88 system.
- Awarded contracts for joint procurement of Livermore and Oak Ridge HPC systems, including NNSA ASC Sierra system, on November 14th.
- Procured and installed Phase 1 cabinets for the new Trinity supercomputer at Los Alamos National Laboratory.
- Developed a unified creep plasticity damage model to assess B61-12 system structural response in normal and abnormal mechanical environments.
- Determined plutonium material strength parameters to improve treatment of plutonium in DSW simulations.
- Completed next-generation code environment preliminary design and plan.

Advanced Simulation and Computing
Funding

(Dollars in Thousands)

	FY 2015 Enacted	FY 2015 Current	FY 2016 Enacted	FY 2017 Request	FY 2017 vs FY 2016
Research, Development, Test and Evaluation					
Advanced Simulation and Computing					
Integrated Codes	149,189	148,601	149,189	149,555	+366
Physics and Engineering Models	68,469	67,819	67,819	67,141	-678
Verification and Validation	52,878	52,878	52,878	52,002	-876
Advanced Technology Development and Mitigation	50,000	50,000	64,000	95,000	+31,000
Computational Systems and Software Environment	109,181	110,919	120,837	130,639	+9,802
Facility Operations and User Support	168,283	167,783	168,283	168,847	+564
Total, Advanced Simulation and Computing	**598,000**	**598,000**	**623,006**	**663,184**	**+40,178**

Outyears for Advanced Simulation and Computing
Funding

(Dollars in Thousands)

	FY 2018 Request	FY 2019 Request	FY 2020 Request	FY 2021 Request
Research, Development, Test and Evaluation				
Advanced Simulation and Computing				
Integrated Codes	155,134	158,236	159,818	163,014
Physics and Engineering Models	69,175	72,682	74,729	77,195
Verification and Validation	53,935	56,553	58,126	60,096
Advanced Technology Development and Mitigation	95,000	95,000	95,000	95,000
Computational Systems and Software Environment	120,000	128,000	140,000	145,000
Facility Operations and User Support	175,000	175,000	180,000	180,000
Total, Advanced Simulation and Computing	**668,244**	**685,471**	**707,673**	**720,305**

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

	FY 2017 vs FY 2016
Advanced Simulation and Computing	
Integrated Codes: Minor Increase to address computer architecture issues on codes resulting from new computer architectures.	+366
Physics and Engineering Models: Minor change for program balancing.	-678
Verification and Validation (V&V): Minor change for program balancing.	-876
Advanced Technology Development and Mitigation: Continue to develop next-gen codes and evaluate performance on advanced hardware test beds. Pursue the objectives, as stated in the National Strategic Computing Initiative, and technologies critical to the foundation for an exascale supercomputer capability for the nation.	+31,000
Computational Systems and Software Environment: Stand up the user environment for the new Trinity system and continue investments in Commodity Technology System (CTS) 1 systems.	+9,802
Facility Operations and User Support: Operate and maintain national laboratory computing centers including recently deployed ASC Advanced Technology Systems (ATS) and CTS. Prepare centers for future systems including exascale that incorporate advanced architectures, and new support systems and equipment.	+564
Total, Advanced Simulation and Computing	**+40,178**

Advanced Simulation and Computing
Integrated Codes

Description

Integrated codes (IC) contain the mathematical descriptions of the physical processes of nuclear weapon systems and function. 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 Stockpile Stewardship Program (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, 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.

FY 2018-FY 2021 Key Milestones

- September 2018 - Provide necessary code and modeling (both 2D and 3D) which informs development of future sustainment programs.
- September 2019 – Revise current ICs with improved parallelization, more modularity, and better standardization that are easily scalable and adaptable.
- Continue efforts in Ongoing User Support and maintenance; Capability Development, and Skills Accession.
- Demonstrate agile IDC and engineering code development by running a single simulation of relevance to DSW on at least 50% of the ATS-1 platform, Trinity, within two years of machine acceptance on a red network.
- Demonstrate agile IDC and engineering code development by running a large number of Uncertainty Quantification (UQ) simulations relevant to DSW on the ATS-2 platform, Sierra, within two years of machine acceptance on a classified network. This should represent a significant improvement over what could be accomplished on the Sequoia platform.

Activities and Explanation of Changes

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs FY 2016
Integrated Codes $149,189,000	**Integrated Codes $149,555,000**	**Integrated Codes +$366,000**
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. 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 • 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. Workforce and accession • Maintain mentoring program for early career staff. • Collaborate with PSAAP2 centers on technical topics and staff recruitment.	• Minor increase to address code resulting from new computer platform 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, which provides the experimental data that informs development of new models used in simulation codes.

FY 2018-FY 2021 Key Milestones

- 4th Quarter FY 2018 - Verify weather loading models for reentry vibration.
- 4th Quarter FY 2019 – Complete phase transition kinetic model for EOS.

Activities and Explanation of Changes

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs FY 2016
Physics and Engineering Models $67,819,000	**Physics and Engineering Models $67,141,000**	**Physics and Engineering Models -$678,000**
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.	• Slight decrease to achieve program balancing.

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 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 activities.

FY 2018-FY 2021 Key Milestones

- 4th Quarter FY 2018 – Extend V&V methodologies to work on extreme scale platforms.
- 4th Quarter FY 2019 – Begin classified UQ analysis on Sierra platform.

Activities and Explanation of Changes

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs FY 2016
Verification and Validation $52,878,000	**Verification and Validation $52,002,000**	**Verification and Validation -$876,000**
Verification and Validation • Verify improvements in nuclear performance codes. • Verify improvements 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. • Develop V&V protocols for algorithms running on hybrid HPC architectures. Predictive Capability Assessment • Assess predictive capability as improvements to codes and models are made available, including new nuclear material data. • 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.	• Slight decrease to achieve program balancing.

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 design codes 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 architecture, 2) maintaining the current IDCs that are a million lines each and 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 two 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.

FY 2018-FY 2021 Key Milestones

- Continue co-design at the NNSA labs.
- Develop new IDCs taking advantage of evolving HPC architectures.
- Continue Exascale PathForward collaborations with industry.
- Demonstrate next-generation IDC technologies on ASC Sierra in FY 2019.

Activities and Explanation of Changes

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs FY 2016
Advanced Technology Development and Mitigation $64,000,000	**Advanced Technology Development and Mitigation $95,000,000**	**Advanced Technology Development and Mitigation +$31,000,000**
• 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-gen codes • Trinity Application Center of Excellence collaboration with system vendor. • Sierra's burst buffer, compiler development, power management, application readiness. • Jointly fund with DOE Office of Science additional Exascale Pathforward node and system design projects.	• 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. • Trinity Application Center of Excellence collaboration with system vendor. • Sierra's burst buffer, compiler development, power management, application readiness. • Jointly manage with DOE Office of Science the Exascale PathForward projects.	• Develop next-generation codes and evaluate their performance on advanced hardware test beds. • 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.

Advanced Simulation and Computing
Computational Systems and Software Environment

Description

The Computation Systems and Software Environment (CSSE) subprogram builds ASC codes, which the computing systems need 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, post-processing visualization and data analysis tools, and next-generation computing technology research. CSSE also, consistent with the National Strategic Computing Initiative, examines possible future post-exascale technologies.

FY 2018-FY 2021 Key Milestones

- Acquire and deploy Commodity Technology System 1 (CTS1) (expected acceptances, March 2016-2018), Advanced Technology System 2 (ATS2) (Sierra, expected acceptance June 2018) and ATS 3 (Crossroads expected acceptance, September 2020) systems and associated computing environment.
- Operate and deploy current platforms, as well as ASC Sierra which will be in General Availability, classified computing mode at the end of FY 2018 and ASC Crossroads end of FY 2021.
- Evaluate D-Wave quantum annealing and other computing technologies to inform future planning.

Activities and Explanation of Changes

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs FY 2016
Computational Systems and Software Environment $120,837,000	**Computational Systems and Software Environment $130,639,000**	**Computational Systems and Software Environment +$9,802,000**
Platform Operations • Provide Sequoia and Cielo operations. • Transition Trinity Haswell partition into classified computing environment. • Continue Tri-lab Linux Capacity Cluster 2 (Provide TLCC2) system operations. • Deploy Trinity with the Knights Landing partition • Initial 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 of 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.	Platform Operations • Provide Sequoia and Trinity operations. • Provide TLCC2 and CTS1 systems operations. • Transition integrated Trinity system into the classified environment. • Deploy CTS1 systems. Capability Development • Support ASC code teams in the porting and scaling of applications on to Trinity. • Further development of 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. • Fund and evaluate the suitability of various post-CMOS technologies, such as quantum and neuromorphic computing, to NNSA's national security mission.	• Stand up the user environment for the new integrated Trinity system. • Continue investment in CTS1 systems. • Transfer investigations into post- complementary metal oxide semiconductor (CMOS) technologies from ATDM subprogram into CSSE.

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.

FY 2018-FY 2021 Key Milestones

- Provide general availability and production-level services for ATS1 (Trinity, December 2016), ATS2 (Sierra, September 2018) and CTS1 (starting in May 2016) systems.
- Continue User Support and Capability Deployment efforts through the planning period for users to achieve optimum levels of service from the investments in the ASC program.
- Conduct User Support and Capability Deployment efforts for users to achieve optimum levels of service from the investments in the ASC program.

Activities and Explanation of Changes

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs FY 2016
Facility Operations and User Support $168,283,000	**Facility Operations and User Support $168,847,000**	**Facility Operations and User Support +$564,000**
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. • Support the Kansas City Plant in the use of ASC codes and computing resources to solve production manufacturing problems.	Continued User Support • Provide Sequoia, Trinity and TLCC2 support. • Provide 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. Ongoing Capability Deployment • Implement contingency response plans, as necessary. • Deploy the needed file system and archival storage technologies. • Support the Kansas City Plant in the use of ASC codes and computing resources to solve production manufacturing problems.	• Operate and maintain national laboratory computing centers including recently deployed ASC Advanced Technology Systems (ATS) and CTS. Prepare centers for future systems including exascale that incorporate advanced architectures, and new support systems and equipment.

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 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021
Reduced Reliance on Calibration - The cumulative percentage reduction in the use of calibration "knobs" to successfully simulate nuclear weapons performance.							
Target	46% cumulative reduction in the use of calibration "knobs"	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"	71% cumulative reduction in the use of calibration "knobs"	78% cumulative reduction in the use of calibration "knobs"	81% cumulative reduction in the use of calibration "knobs"
Result	46						
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 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 2015 Enacted	FY 2015 Current	FY 2016 Enacted	FY 2017 Request	FY 2017 vs FY 2016 Request
Capital Operating Expenses Summary (including (Major Items of Equipment (MIE)							
Capital Equipment >$500K (including MIE)	N/A	N/A	70,427	70,427	79,976	84,599	+4,623
Plant Projects (GPP) (<$10M)	N/A	N/A	5,165	5,165	5,104	1,864	-3,240
Total, Capital Operating Expenses	**N/A**	**N/A**	**75,592**	**75,592**	**85,080**	**86,463**	**+1,383**
Capital Equipment > $500K (including MIE)							
Total Non-MIE Capital Equipment (>$500K)	N/A	N/A	70,427	70,427	71,976	73,599	+1,623
Exascale Class Computer Cooling Equipment, LANL	35,000	0	0	0	8,000	11,000	+3,000
Total, Capital Equipment (including MIE)	N/A	N/A	**70,427**	**70,427**	**79,976**	**84,599**	**+4,623**
Plant Projects (GPP and IGPP) (Total Estimated Cost (TEC) <$10M)							
Total Plant Projects (GPP) (Total Estimated Cost (TEC) <$5M)	N/A	N/A	1,785	1,785	1,824	1,864	+40
B-654 Livermore Computing, LLNL	9,720	3,060	3,380	3,380	3,280	0	-3,280
Total, Plant Projects (GPP) (Total Estimated Cost (TEC) <$10M)	**9,720**	**3,060**	**5,165**	**5,165**	**5,104**	**1,864**	**-3,240**
Total, Capital Summary	**N/A**	**N/A**	**75,592**	**75,592**	**85,080**	**86,463**	**+1,383**

Outyears for Advanced Simulation and Computing

(Dollars in Thousands)

	FY 2018 Request	FY 2019 Request	FY 2020 Request	FY 2021 Request
Capital Operating Expenses Summary (including (Major Items of Equipment (MIE)				
Capital Equipment >$500K (including MIE)	86,177	81,831	78,521	80,248
Plant Projects (GPP) (<$10M)	1,905	1,947	1,990	2,034
Total, Capital Operating Expenses	**88,082**	**83,778**	**80,511**	**82,282**
Capital Equipment > $500K (including MIE)				
Total Non-MIE Capital Equipment (>$500K)	75,177	76,831	78,521	80,248
Exascale Class Computer Cooling Equipment, LANL	11,000	5,000	0	0
Total, Capital Equipment (including MIE)	**86,177**	**81,831**	**78,521**	**80,248**
Plant Projects (GPP) (Total Estimated Cost (TEC) <$10M)				
Total Plant Projects (GPP) (Total Estimated Cost (TEC) <$5M)	1,905	1,947	1,990	2,034
Total, Plant Projects (GPP) (Total Estimated Cost (TEC) <$10M)	**1,905**	**1,947**	**1,990**	**2,034**
Total, Capital Summary	**88,082**	**83,778**	**80,511**	**82,282**

Advanced Manufacturing Development

Overview

To significantly reduce cost and schedule risk associated with the development and production of stockpile components, the National Nuclear Security Administration (NNSA) is exploring the development of an array of advanced technologies and then ensure those technologies can be used to produce components for the stockpile. This process must begin prior to the commencement of a Life Extension Program (LEP) to ensure technologies can be confidently matured in time to be qualified and manufactured for insertion into the stockpile. The Advanced Manufacturing Development (AMD) program is focused on developing new manufacturing processes and components for improving production for transition to future weapons programs. This development work is done 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 waste, floor space requirements, and production time. Developing, testing and qualifying these modern processes, given the rigorous qualification requirements for nuclear weapons, frequently takes 7 to 10 years, and these investments should be identified, funded, and developed well in advance of future LEPs. The AMD program also enables Defense Programs to meet Department of Defense requirements while also maintaining the ability to provide rapid response to evolving national security requirements. AMD investments are focused on the development approach of advanced manufacturing technologies, capabilities, and equipment.

The AMD program is comprised of three subprograms:

1. **Additive Manufacturing**: Capitalizes on the potential of additive manufacturing technologies to improve the reliability and effectiveness of the enduring stockpile; improve infrastructure responsiveness (i.e., reduce schedule risk, cost, and time to develop, assess, qualify, and certify the product); and, attract, train, and retain an expert workforce through implementation of 21st century manufacturing technology. Additive Manufacturing focus is to characterize and resolve issues associated with the use of additive manufacturing in support of the stockpile, as well as demonstrate the feasibility of investments in additive manufacturing.

2. **Component Manufacturing Development (CMD):** Develops and deploys multi-site, multi-weapon component manufacturing needed to replace sunset technologies, ensuring upgraded, cost-effective production processes in support of the nuclear weapons stockpile. Development of these technologies is subject to a technology readiness level (TRL) and manufacturing readiness level (MRL) assessment process to make informed decisions. Of the nine readiness levels, ranging from early assessment to a completed part or process, the CMD subprogram is responsible primarily for development efforts, which takes a component from laboratory design to engineering design and manufacturing replication so that it can be qualified, and then tailored for a specific weapon within Directed Stockpile Work (DSW). The intent is to provide improvements in technology or advanced manufacturing techniques to lessen schedule and cost risks.

3. **Process Technology Development:** Supports the development, demonstration, and utilization of new production technologies to reduce costs and enhance nuclear manufacturing processes for nuclear weapon materials. This subprogram 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 for the -Y-12 National Security Complex (Y-12).

Highlights of the FY 2017 Budget Request

- Further understand additive manufacturing and its potential, continue to advance the research and development of additive manufacturing projects initiated in FY 2016, and begin the research and development of new additive manufacturing projects. The aim is to demonstrate the feasibility of using additive manufacturing to support the stockpile as soon as possible, with further expansion in stockpile applications as our knowledge of and confidence in the technology improves.
- Develop new and/or improve base technologies that apply to multiple weapons, to produce and manufacture technologies for the nuclear security enterprise with a focus on maturing technologies applicable to multiple weapons until ready-for-qualification-test readiness level, then tailor these technologies to specific weapons within DSW. Work

starts prior to Phase 6.1, Concept Assessment, and generally transitions prior to Phase 6.3, Development Engineering. No funding will be provided for LEPs that are in Phase 6.3 or higher. Planned tasks involve finishing electronics-based arming and fuzing technologies that require significant technical effort to reduce the cost of replacing sunset technologies. Other identified tasks include advanced microelectronics, heterojunction bipolar transistor development and testing, thermally conductive polymers and foams, computational simulation, advanced material development, development of aluminum vessels for tritium service, trusted and secure manufacturing, neutron generator tester development, and PBX 9502 and triaminotrinitrobenzene (TABT) process maturation and product qualification.

- Fund three major items of equipment (MIE): the calciner, the electro-refiner, and initial efforts to replace the machine chip processing process. These efforts support ceasing enriched uranium programmatic operations in Building 9212 at Y-12 by 2025.

FY 2015 Accomplishments

- Developed the *Additive Manufacturing Ten-Year Strategic Program Plan,* and gained a better understanding of the science that allows additive manufacturing possible through multi-site integrated product teams tasked with testing materials and modeling processes.
- Initiated manufacturing processes, prototypes, and first production units for stockpile applications regarding critical tooling, pads and cushions, and other assemblies were initiated.
- Successfully completed 15 Level 2 milestones throughout the Nuclear Security Enterprise ranging in developing joint radar modules, direct ink writing, and firesets to performing process development improvements for gas transfer systems and neutron generator testers.
- Determined technical specifications and procured necessary equipment related to radiography and electron beam advanced manufacturing (EBAM), including the mills necessary to fabricate the wire required by the EBAM.
- Achieved Critical Decision-1, Approve Alternative Selection and Cost Range and Critical Decision-3A, Approval for Long Lead Procurement (CD-1/3A) to install a rotary calciner, as well as an electro-refiner in Building 9212 at Y-12.

Major Outyear Priorities and Assumptions

Outyear funding levels for the AMD program total $301,910,000 for FY 2018 through FY 2021. With completion of manufacturing support to the B61-12 LEP and W88 Alt 370, the focus will be on development of technologies and advanced manufacturing applicable to multiple weapon systems, as well as the W80-4 LEP.

This involves:

- Continue exploring the potential application of additive manufacturing capabilities that can be used by relevant programs to support their specific mission requirements.
- Sustain manufacturing and technology development required to produce redesigned or new components needed as a result of aging, performance issues, material availability issues, or necessary surety enhancements in an ever-changing environment (e.g., material changes driven by Federal regulations or loss of a sole-source supplier).
- Leverage components that apply to multiple weapons, and thus reducing the cost of development and employing efficient manufacturing processes. Given the difference in CMD funding, reduced support for relevant manufacturing technologies for potential use by the W80-4 LEP in its early maturation phase only increases risks to cost and schedule.
- One additional MIE, direct electrolytic reduction, in support of ceasing enriched uranium programmatic operations in Building 9212 at Y-12 by 2025.

Advanced Manufacturing Development
Funding

(Dollars in Thousands)

	FY 2015 Enacted	FY 2015 Current	FY 2016 Enacted	FY 2017 Request	FY 2017 vs FY 2016
Advanced Manufacturing Development					
Additive Manufacturing	12,600	12,600	12,600	12,000	-600
Component Manufacturing Development	75,000	75,000	99,656	46,583	-53,073
Process Technology Development	19,600	19,600	17,800	28,522	+10,722
Advanced Manufacturing Development	**107,200**	**107,200**	**130,056**	**87,105**	**-42,951**

Outyears for Advanced Manufacturing Development
Funding

(Dollars in Thousands)

	FY 2018 Request	FY 2019 Request	FY 2020 Request	FY 2021 Request
Advanced Manufacturing Development				
Additive Manufacturing	12,000	12,000	12,000	12,000
Component Manufacturing Development	27,791	23,303	36,982	46,666
Process Technology Development	30,055	31,167	28,702	29,244
Advanced Manufacturing Development	**69,846**	**66,470**	**77,684**	**87,910**

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

	FY 2017 vs FY 2016
Advanced Manufacturing Development	
Additive Manufacturing: The decrease reflects realignment from technology development investments to address higher NNSA priorities	-600
Component Manufacturing Development: The decrease reflects a realignment from technology development investments to address higher NNSA priorities with focus on continued high-priority investment to improve the manufacturing processes for components that support multiple weapons to maximize the benefits of these investments.	-53,073
Process Technology Development: The increase reflects the continued acceleration of the calciner and electro-refiner projects, and initial efforts to replace the chip processing process. These latter projects support stopping enriched uranium programmatic operations in Building 9212 at Y-12 by 2025.	+10,722
Total, Advanced Manufacturing Development	**-42,951**

Advanced Manufacturing Development
Additive Manufacturing

Description

The Additive Manufacturing subprogram funds those activities that have the greatest likelihood to improve the reliability and effectiveness of the enduring stockpile; improve infrastructure responsiveness (i.e., reduce schedule risk, cost, and time to develop, assess, qualify, and certify the product); and attract, train, and retain expert workforce through implementation of 21st century manufacturing technology.

Additive manufacturing, also known as 3D printing, is an advanced manufacturing technology that has the potential to dramatically reduce the fabrication costs of the weapon components thus benefitting the Nuclear Security Enterprise. 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, tooling, and stockpile components used in Life Extension Programs.

When deploying any new technology, gaining confidence in it for stockpile applications is a major challenge. With measured investments, and by leveraging existing programmatic work, near-term benefits of additive manufacturing will be realized while gaining understanding of the feasibility of making long-term investments for more challenging applications.

FY 2018-FY 2021 Key Milestones

- Continue to broaden understanding of the science behind additive manufacturing.
- Continue research and development of new additive manufacturing capabilities in order to realize its full potential in decreasing production schedules and design cycles while recognizing associated cost avoidances at all participating sites.

Activities and Explanation of Changes

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 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 applications. • Further improve understanding of the science behind additive manufacturing through material testing and process modeling. • Continue to examine how additive manufacturing can be used to reduce qualification time for improved technologies and production process.	• The decrease reflects realignment from technology development efforts to address higher NNSA priorities.

Advanced Manufacturing Development
Component Manufacturing Development

Description

The Component Manufacturing Development (CMD) subprogram develops and deploys multi-site, multi-weapon component manufacturing needed to replace sunset technologies, upgrades existing technologies, and provides new technologies in a cost-effective manner in support of the nuclear weapons stockpile. CMD develops new manufacturing processes required to produce high explosive and other energetic materials, nonnuclear and special materials, as well as other components that improve the safety, reliability, and security of the stockpile.

The CMD subprogram mission scope addresses four functional areas as follows:

(1) **Advanced Manufacturability Studies**. Early ability to manufacture technologies and associated processes from initial concept to laboratory design. Projects in this category are medium risk with high return on investment and are prioritized based on need and impact to programmatic stability. Activities include advanced radar systems, next generation gas transfer systems, advanced microelectronics, and thermally conductive polymers and foams.

(2) **Manufacturing Process Development**. Manufacturing process characterization activities for all components which takes a component from laboratory design to engineering design and manufacturing replication so that it can be qualified then tailored for a specific weapon within DSW. These activities include, but are not limited to, prototype builds and testing, supply chain optimization and vendor qualification for trusted procurements, commercial-off-the-shelf purchases, and design-to-manufacture iterations with design agencies.

(3) **Equipment, Materials, and Infrastructure**. Development of tools, materials, and equipment that facilitate the production process including data management systems, workstation enhancements, material studies, and machine tool modernization.

(4) **Manufacturing Diagnostic Development**. Design, development, and demonstration of the diagnostic processes necessary for production, inspection, testing, and qualification of nuclear weapon components. This includes, but is not limited to, electronic and mechanical testing, micro-focus chromatography, neutron generator testers, digital radiography, metal component certification, and canned subassembly screening processes.

FY 2018-FY 2021 Key Milestones

Continue:

- Implementation of proven additive manufacturing capabilities in order to realize its full potential in decreasing production schedules and design cycles while recognizing associated cost savings at all participating sites.
- Computational simulations for developing advanced radar and firing set components and inspection and testing of other non-nuclear components at the Kansas City National Security Campus.
- Developing and testing heterojunction bipolar transistors (HBT) and developing neutron generator testers per the Sandia National Laboratories roadmap.
- Development and qualification of insensitive high explosives for use in multiple weapon systems from a commercial source utilizing skills from Lawrence Livermore National Laboratory and Los Alamos National Laboratory.
- Initiate manufacturability studies for components required for the interoperable warhead.
- Multi-year developmental program to ensure continuous operations at the Savannah River Site for tritium loading, purification, storage, aging, and function tester stations.

Activities and Explanation of Changes

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs FY 2016
Component Manufacturing Development $99,656,000	**Component Manufacturing Development $46,583,000**	**Component Manufacturing Development -$53,073,000**
• Continue Nuclear Security Campus (NSC) development of electrical component assemblies for the radar. • Continue NSC upgrades to major component assemblies associated with arming and fuzing functions. • Continue NSC development of production machining and assembly for gas transfer systems (GTS). • Continue NSC advanced material development of Direct Ink Write technology. • Initiate NSC 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 (PX) 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	• Complete NSC development of electrical component assemblies for the radar. • Complete NSC upgrades to major component assemblies associated with arming and fuzing functions. • Continue NSC development of capability or work associated with trusted and secure manufacturing, computational simulations for additive manufacturing, and advanced additive metal production process. • Continue LLNL and LANL developmental IHE production (e.g., TATB, PBX 9502, LX-21) and qualification activities. • Continue PX work associated with additive manufacturing of mission tooling and materials, PBX 9502/TATB production maturation and qualification, and XTX production maturation and qualification. • Continue SNL neutron generator tester development and thermally conductive polymers and foams. • Complete SNL HBT process development and testing. • Continue Savannah River National Laboratory (SRNL) limited life component work regarding advanced materials development and aluminum vessels for tritium service. • Continue projects that expand application of advanced manufacturing throughout the nuclear security enterprise.	• The decrease reflects a realignment from technology development investments to address higher NNSA priorities. The Budget Request will focus on continued investment in advanced manufacturing opportunities and improving the manufacturing processes for components that support multiple weapons to maximize the benefits of these investments.

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs FY 2016
qualification, Integrated Pump-Down and Fill Station (IPFS), and annealed pit tubes. • Continue Sandia National Laboratories (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 SRNL 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, NSC, SNL, and SRNL. • Continue advanced initiation systems manufacturability studies at LANL and NSC. • 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 the Y-12 National Security Complex (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 the calciner, the electro-refiner, direct electrolytic reduction, and machine chip processing.

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.

FY 2018-FY 2021 Key Milestones

- Accelerate the electro-refiner MIE in support of a FY 2020 completion.
- Accelerate the calciner MIE in support of a FY 2021 completion.
- Refine the scope for the direct electrolytic reduction and machine chip processing MIE.

Activities and Explanation of Changes

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs FY 2016
Process Technology Development $17,800,000	**Process Technology Development $28,522,000**	**Process Technology Development +$10,722,000**
• Continues to support three major items of equipment (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 – the recovery of EU machine tool turnings for subsequent reuse in manufacturing processes.	• Continues to support three MIE and associated Technology Development efforts: - 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 – the recovery of EU machine tool turnings for subsequent reuse in manufacturing processes.	• This increase will support the accelerated deployment of calciner and electro-refiner (which aids production of uranium) technology.

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 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021
Component Manufacturing Development - The annual progress towards the maturation of production technologies and manufacturing capabilities as measured by the number of deliverables completed.							
Target	6 deliverables	5 deliverables	6 deliverables	5 deliverables	5 deliverables	5 deliverables	5 deliverables
Result	6						
Endpoint Target	The NNSA will continue to mature production technologies and manufacturing capabilities to support nuclear weapon refurbishment and assessment activities to support Directed Stockpile Work.						

Advanced Manufacturing Development
Capital Summary

(Dollars in Thousands)

	Total	Prior Years	FY 2015 Enacted	FY 2015 Current	FY 2016 Enacted	FY 2017 Request	FY 2017 vs FY 2016 Request
Capital Operating Expenses Summary (including (Major Items of Equipment (MIE)							
Capital Equipment >$500K (including MIE)	N/A	N/A	34,184	30,695	36,411	39,733	+3,322
Plant Projects (GPP) (<$10M)	N/A	N/A	0	0	0	0	0
Total, Capital Operating Expenses	**N/A**	**N/A**	**34,184**	**30,695**	**36,411**	**39,733**	**+3,322**
Capital Equipment > $500K (including MIE)							
Total Non-MIE Capital Equipment (>$500K)	N/A	N/A	14,584	14,584	14,905	15,233	+328
5-Axis Machining Center	3,706	0	0	0	3,706	0	-3,706
Calciner, Y-12	26,300	0	11,800	7,800	8,500	10,000	+1,500
Machine Chip Processing, Y-12	2,500	0	0	0	1,500	1,000	-500
Electrofiners, Y-12	32,011	2,400	7,800	8,311	7,800	13,500	+5,700
Direct Electrolytic Reduction, Y-12	0	0	0	0	0	0	0
Total, Capital Equipment (including MIE)	**64,517**	**2,400**	**34,184**	**30,695**	**36,411**	**39,733**	**+3,322**
Plant Projects (GPP and IGPP) (Total Estimated Cost (TEC) <$10M)							
Total Plant Projects (GPP) (Total Estimated Cost (TEC) <$5M)	N/A	N/A	0	0	0	0	0
Total, Plant Projects (GPP) (Total Estimated Cost (TEC) <$10M)	**N/A**	**N/A**	**0**	**0**	**0**	**0**	**0**
Total, Capital Summary	**N/A**	**N/A**	**34,184**	**30,695**	**36,411**	**39,733**	**+3,322**

Outyears for Advanced Manufacturing Development

(Dollars in Thousands)

	FY 2018 Request	FY 2019 Request	FY 2020 Request	FY 2021 Request
Capital Operating Expenses Summary (including (Major Items of Equipment (MIE)				
Capital Equipment >$500K (including MIE)	45,218	44,960	42,360	36,618
Plant Projects (GPP) (<$10M)	0	0	0	0
Total, Capital Operating Expenses	**45,218**	**44,960**	**42,360**	**36,618**
Capital Equipment > $500K (including MIE)				
Total Non-MIE Capital Equipment (>$500K)	15,568	15,910	16,260	16,618
5-Axis Machining Center	0	0	0	0
Calciner, Y-12	8,650	10,800	50	0
Machine Chip Processing, Y-12	500	1,000	10,000	5,000
Electrorefiners, Y-12	20,500	17,000	6,050	0
Direct Electrolytic Reduction, Y-12	0	250	10,000	15,000
Total, Capital Equipment (including MIE)	**45,218**	**44,960**	**42,360**	**36,618**
Plant Projects (GPP) (Total Estimated Cost (TEC) <$10M)				
Total Plant Projects (GPP) (Total Estimated Cost (TEC) <$5M)	0	0	0	0
Total, Plant Projects (GPP) (Total Estimated Cost (TEC) <$10M)	**0**	**0**	**0**	**0**
Total, Capital Summary	**45,218**	**44,960**	**42,360**	**36,618**

Note: The 5-Axis Machining Center was funded in FY 2016.

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. This mission directly supports the Department of Energy (DOE) Nuclear Security goal to strengthen national security by maintaining the nuclear stockpile and modernizing the nuclear security infrastructure, reducing global nuclear threats, providing for nuclear propulsion, improving physical and cybersecurity, and strengthening key science, technology, and engineering capabilities. 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 through Capabilities Based Investments and Line Item Construction projects.

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, and 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), the Packaging subprogram, and the 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 Capabilities-Based Investments subprogram, is key to arresting the declining state of NNSA infrastructure. A sustained investment in Recapitalization is needed to address the current numerous obsolete support and safety systems, to revitalize facilities that are beyond the end of their design life, and to 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 only, (excludes OPCs for CMRR, UPF, and the U1a Complex Enhancements Project), 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 2017 Budget Request

The FY 2017 Infrastructure and Operations Budget Request totals $2,721,952,000, 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, dispose of the Kansas City Bannister Federal Complex, and execute additional Recapitalization projects to address critical safety and program risks. This Request includes an increase to complete the design of the Uranium Processing Facility (UPF) and associated buildings, support structures and process equipment. The increase also supports continued construction in approved subprojects supporting UPF infrastructure and site preparation activities.

Major Outyear Priorities and Assumptions

Outyear funding levels for Infrastructure and Operations total $11,153,716,000 for FY 2018 through FY 2021. Outyear priorities will continue to focus on modernizing NNSA's infrastructure to reduce mission and safety risks through the application of an enterprise risk management methodology, with line item construction investments largely directed to uranium and plutonium infrastructure. The increased investment in existing infrastructure and equipment replacements sustains programmatic capabilities without construction of new facilities. NNSA will seek operational efficiencies by deactivating facilities that are no longer needed, thereby reducing operations, maintenance, and recapitalization requirements.

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 2015 (dollars in thousands)	
Total DM	$3,667,183
DM on excess facilities	$497,216
DM on facilities to be excess in 10 years	$354,920

Approximately 23 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 that will be addressed with FY 2017 funding.

Table 2

NNSA's Top Ten High-Risk Excess Facilities			
Site	**Facility**	**Year Built**	**Year Shut Down**
Y-12	Alpha 5, Building 9201-05	1945	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	1951	1999
KC	Bannister Federal Complex	1942	2014
LANL	HE Pressing Complex, Building TA-16-0430	1953	2007

Infrastructure and Operations
Funding

(Dollars in Thousands)

	FY 2015 Enacted	FY 2015 Current	FY 2016 Enacted	FY 2017 Request	FY 2017 vs FY 2016
Infrastructure and Operations (formerly RTBF)					
Operating					
Operations of Facilities					
Kansas City National Security Campus (formerly Kansas City Plant)	125,000	125,000	100,250	101,000	+750
Lawrence Livermore National Laboratory	71,000	71,000	70,671	70,500	-171
Los Alamos National Laboratory	198,000	198,000	196,460	196,500	+40
Nevada National Security Site	89,000	89,000	89,000	92,500	+3,500
Pantex	75,000	72,353	58,021	55,000	-3,021
Sandia National Laboratories	106,000	106,000	115,300	118,000	+2,700
Savannah River Site	81,000	81,000	80,463	83,500	+3,037
Y-12 National Security Complex	151,000	149,917	120,625	107,000	-13,625
Total, Operations of Facilities	**896,000**	**892,270**	**830,790**	**824,000**	**-6,790**
Program Readiness	68,000	71,892	0	0	0
Material Recycle and Recovery	126,000	126,000	0	0	0
Containers	26,000	26,000	0	0	0
Storage	40,800	40,800	0	0	0
Safety and Environmental Operations	0	0	107,701	110,000	+2,299
Maintenance and Repair of Facilities	227,000	227,000	277,000	294,000	+17,000
Recapitalization					
Recapitalization	224,600	224,600	0	0	0
Infrastructure and Safety	0	0	253,724	554,643	+300,919
Capability Based Investments	0	0	98,800	112,639	+13,839
Subtotal, Recapitalization	**224,600**	**224,600**	**352,524**	**667,282**	**+314,758**
Total, Operating	**1,608,400**	**1,608,562**	**1,568,015**	**1,895,282**	**+327,267**
Construction	425,000	425,000	711,109	826,670	+115,561
Total, Infrastructure and Operations (formerly RTBF)	**2,033,400**	**2,033,562**	**2,279,124**	**2,721,952**	**+442,828**

Outyears for Infrastructure and Operations
Funding

(Dollars in Thousands)

	FY 2018 Request	FY 2019 Request	FY 2020 Request	FY 2021 Request
Infrastructure and Operations (formerly RTBF)				
Operating				
Operations of Facilities				
Kansas City National Security Campus (formerly Kansas City Plant)	102,000	105,000	106,000	110,000
Lawrence Livermore National Laboratory	74,000	80,000	82,000	84,000
Los Alamos National Laboratory	189,000	196,000	200,000	205,000
Nevada National Security Site	95,000	94,000	97,000	99,000
Pantex	56,000	56,000	57,000	58,000
Sandia National Laboratories	118,000	122,000	126,000	129,000
Savannah River Site	83,000	89,000	92,000	95,000
Y-12 National Security Complex	104,000	105,000	103,000	104,000
Total, Operations of Facilities	**821,000**	**847,000**	**863,000**	**884,000**
Program Readiness	0	0	0	0
Recovery	0	0	0	0
Containers	0	0	0	0
Storage	0	0	0	0
Safety and Environmental Operations	113,000	111,000	114,000	115,000
Maintenance and Repair of Facilities	305,000	327,000	315,000	328,000
Recapitalization				
Recapitalization				
Infrastructure and Safety	334,982	339,590	353,340	374,709
Capability Based Investments	119,850	132,703	150,166	120,185
Subtotal, Recapitalization	454,832	472,293	503,506	494,894
Total, Operating	**1,693,832**	**1,757,293**	**1,795,506**	**1,821,894**
Construction	952,095	1,035,600	1,033,596	1,063,900
Total, Infrastructure and Operations (formerly RTBF)	**2,645,927**	**2,792,893**	**2,829,102**	**2,885,794**

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

	FY 2017 vs FY 2016
Infrastructure and Operations	
Operations of Facilities:	
• **Kansas City National Security Campus (KC):** No significant changes.	**+$750**
• **Lawrence Livermore National Laboratory (LLNL)**: No significant changes.	**-$171**
• **Los Alamos National Laboratory (LANL)**: No significant changes.	**+$40**
• **Nevada National Security Site (NNSS)**: No significant changes.	**+$3,500**
• **Pantex Plant**: The decrease reflects anticipated efficiencies gained via increased investments in Maintenance and Repair of Facilities and Recapitalization.	**-$3,021**
• **Sandia National Laboratories (SNL)**: No significant changes.	**+$2,700**
• **Savannah River Site (SRS)**: No significant changes.	**+$3,037**
• **Y-12 National Security Complex (Y-12)**: The decrease reflects anticipated efficiencies gained via increased investments in Maintenance and Repair of Facilities and Recapitalization.	**-$13,625**
Safety and Environmental Operations: No significant changes.	**+$2,299**
Maintenance and Repair of Facilities: The increase provides additional funding to continue the stabilization of deferred maintenance, improve working condition of NNSA facilities and equipment, and stabilize excess facilities.	**+$17,000**
Recapitalization:	
• **Infrastructure and Safety:** The majority of the increase supports the transfer of the Kansas City Bannister Federal Complex; increased investments for upgrading aging infrastructure to address safety and programmatic risks, improve productivity, and lower operating costs. In addition, supports the deactivation and disposition of facilities that are no longer needed.	**+$300,919**
• **Capabilities Based Investments (CBI)**: Increases in CBI are mainly due to two factors: 1) planning and conceptual design for CBI projects moved from Strategic Materials Sustainment, and 2) increased funding for capabilities supporting weapons life extension programs (LEPs) and major alterations.	**+$13,839**

	FY 2017 vs FY 2016
Construction: The significant increase in construction supports the Uranium Processing Facility (UPF) project at Y-12. Consistent with the recommendations of the April 2014 Peer Review led by Dr. Thom Mason of Oak Ridge National Laboratory (ORNL), 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 permits each facility to be designed and constructed with a level of safety and security appropriate for the hazards of each operation. FY 2017 funds will be used to complete facility designs and for construction of approved subprojects. The current estimate to complete the design of UPF buildings is higher than what was reported in the FY 2016 President's Budget Request. The strategy provides a more consistent annual funding profile for enriched uranium (EU) investments, balanced between the delivery of new build facilities and reduction of risk in ongoing operations. The Uranium Program Manager has the authority and responsibility to balance the funding stream investments across the enterprise. Provides full funding for design and construction of the Expand Electrical Distribution System project at LLNL. Additionally, provides funding for design and construction of the Albuquerque Complex Project and initiates the design and construction for the U1a Complex Enhancements Project at NNSS.	**+$115,561**
Total, Infrastructure and Operations	**+$442,828**

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 and 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 2018-FY 2021 Key Milestones

The outyears will continue to fund base operations.

Activities and Explanation of Changes

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs FY 2016
Operations of Facilities		
Kansas City National Security Campus $100,250,000	**Kansas City National Security Campus $101,000,000**	**Kansas City National Security Campus +$750,000**
• Funding supports base facility operations in support of non-nuclear production. This includes facility operations, utilities, steam, gas and electric distribution, leases, program management, waste management, ES&H and industrial safety. • This also includes funds for shutdown and surveillance activities at Bannister Road to meet regulatory requirements.	• Funding supports base facility operations in support of non-nuclear production. **FY 2018-FY 2021** • The outyears will continue to fund base facility operations.	• No significant changes.
Lawrence Livermore National Laboratory $70,671,000	**Lawrence Livermore National Laboratory $70,500,000**	**Lawrence Livermore National Laboratory -$171,000**
• Funding provides for base operations to support nuclear security enterprise missions. This includes providing for facility and infrastructure operations, which support plutonium, tritium and high explosives activities; environmental tests; and regulated site-wide comprehensive waste management. It also funds waste management facilities and activities including treatment, and offsite disposal of TRU waste to the Waste Isolation Pilot Plant (WIPP).	• Funding provides for base operations to support plutonium, tritium and high explosive nuclear security enterprise missions. **FY 2018-FY 2021** • The outyears will continue to fund base facility operations.	• No significant changes.
Los Alamos National Laboratory $196,460,000	**Los Alamos National Laboratory $196,500,000**	**Los Alamos National Laboratory +$40,000**
• Funding provides for base operations in support of plutonium production, research and development; chemistry and metallurgy research; weapons engineering and tritium capability; and beryllium operations. Also, funds 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).	• Funding provides for base operations in support of plutonium production, research, and development; chemistry and metallurgy research; weapons engineering and tritium capability; and beryllium operations. **FY 2018-FY 2021** • The outyears will continue to fund base facility operations.	• No significant changes.

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs FY 2016
Funds the Los Alamos Pueblo Project at approximately $800,000 per year.		
Nevada National Security Site $89,000,000	**Nevada National Security Site $92,500,000**	**Nevada National Security Site +$3,500,000**
• Funding provides for base operations, including facility operations, utilities, steam, gas and electric distribution, leases, program management, and waste management. It also supports 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 provides for base operations, including experimental capabilities. **FY 2018-FY 2021** • The outyears will continue to fund base facility operations.	• No significant changes.
Pantex Plant $58,021,000	**Pantex Plant $55,000,000**	**Pantex Plant -$3,021,000**
• Funding provides for base operation costs, including facility operations, utilities, steam, gas and electric distribution, leases, program management, and waste management. It also supports 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 funds payment in lieu of taxes.	• Funding provides for base operation costs, including industrial and high explosives to support weapon assembly, disassembly, and surveillance in support of the LEPs. **FY 2018-FY 2021** • The outyears will continue to fund base facility operations.	• The decrease reflects anticipated efficiencies gained via increased investments in Maintenance and Repair of Facilities and Recapitalization.

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs FY 2016
Sandia National Laboratories $115,300,000	**Sandia National Laboratories $118,000,000**	**Sandia National Laboratories +$2,700,000**
• Funding provides 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 provides for base operations, including environmental testing and microelectronics technologies facilities. **FY 2018-FY 2021** • The outyears will continue to fund base facility operations.	• No significant changes.
Savannah River Site $80,463,000	**Savannah River Site $83,500,000**	**Savannah River Site +$3,037,000**
• Funding for base operations including facility operations, utilities, steam, gas and electric distribution, leases, program management, and waste management. It also supports 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 deuterium gases; and surveillance of GTS.	• Funding provides for base operations, including tritium capabilities. **FY 2018-FY 2021** • The outyears will continue to fund base facility operations.	• No significant changes.
Y-12 National Security Complex $120,625,000	**Y-12 National Security Complex $107,000,000**	**Y-12 National Security Complex -$13,625,000**
• Funding provides for base operations, including facility operations, utilities, steam, gas and electric distribution, leases, program management, and waste management. It also supports 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	• Funding provides for enriched and depleted uranium operations; lithium and other special material operations. **FY 2018-FY 2021** • The outyears will continue to fund base facility operations.	• The decrease reflects anticipated efficiencies gained via increased investments in Maintenance and Repair of Facilities and Recapitalization.

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs FY 2016
weapon assembly and disassembly in support of LEPs. Also funds payment in lieu of taxes.		

Infrastructure and Operations
Safety and Environmental Operations

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 3 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 criticality 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).

FY 2018-FY 2021 Key Milestones

- Develop, maintain, and disseminate nuclear criticality safety tools, training and data.
- Provide technical foundation for nuclear safety analysis and authorization basis for decision-making.
- Complete delivery of first DPP-1 and DPP-3 containers by 2020.
- Treat and monitor legacy contamination at KC, LLNL (Main Site and Site 300), Pantex and SNL.

Table 3

National Nuclear Security Administration Safety and Environmental Operations Subprograms (dollars in thousands, FY 2017 Comparable Structure)								
Subprogram	**FY 2015**	**FY 2016**	**FY 2017**	**FY 2018**	**FY 2019**	**FY 2020**	**FY 2021**	**FY 2017-FY 2021**
Nuclear Criticality Safety Program	$18,241	$23,785	$27,298	$26,086	$26,093	$26,954	$27,517	$133,948
Nuclear Safety Research and Development	$0	$4,000	$3,837	$3,838	$3,839	$3,839	$3,926	$19,279
Packaging	$26,000	$27,701	$28,804	$28,916	$29,290	$31,648	$31,541	$150,199
Long Term Stewardship	$48,700	$52,215	$50,061	$54,160	$51,778	$51,559	$52,016	$259,574
TOTAL	**$92,941**	**$107,701**	**$110,000**	**$113,000**	**$111,000**	**$114,000**	**$115,000**	**$563,000**

Activities and Explanation of Changes

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs FY 2016
Safety and Environmental Operations $107,701,000	**Safety and Environmental Operations $110,000,000**	**Safety and Environmental Operations +$2,299,000**
Nuclear Criticality Safety Program $23,785,000	**Nuclear Criticality Safety Program $27,298,000**	**Nuclear Criticality Safety Program +$3,513,000**
• 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 that includes the DOE Nuclear Criticality Safety Program's NCERC to ensure that criticality safety capabilities are adequate for the DOE mission.	• Continues to provide 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 DOE Nuclear Criticality Safety Program's NCERC to ensure criticality safety capabilities are adequate for the DOE mission. **FY 2018-FY 2021** • 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 DOE Nuclear Criticality Safety Program's NCERC to ensure that criticality safety capabilities are adequate for the DOE mission in accordance with the NCSP Ten Year Mission and Vision (2014-2023).	• The increase supports additional criticality experiments and facility upgrades at NNSS.
Nuclear Safety Research and Development $4,000,000	**Nuclear Safety Research and Development $3,837,000**	**Nuclear Safety Research and Development -$163,000**
• The NSR&D activities provide the technical foundation for safety analyses and controls as well as authorization basis decision making for DOE/NNSA nuclear facilities and associated operations.	• Provides 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.

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs FY 2016
	FY 2018-FY 2021 • Provide funds for continued Nuclear Safety R&D activities for improved safety and efficiency in the operations of defense nuclear facilities within their approved safety bases.	
Packaging $27,701,000	**Packaging $28,804,000**	**Packaging +$1,103,000**
• Continues with development and certification of the DPP-3 container to improve safety, security, maintainability, and maintain content quality. • Completes development and certification of the DPP-1 container to improve safety, security, maintainability, and maintain content quality. • Recertifies container fleet every five years (or as necessary) to ensure containers still meet regulations and requirements. • Continues to add new contents to existing container fleet. • Complete fabrication of needed DPP-2 to support phased transition of contents from the DT-22. • Commence fabrication of needed DPP-1 to support phased transition of contents from the Model FL container. • Provides container refurbishment, reconditioning, and annual maintenance and certification to ensure containers are available for use to support weapons production, Life Extension Program (LEP), surveillance, and dismantlement activities.	• Complete final design and regulatory tests of DPP-1 and DPP-3; • Refurbish, recondition, maintain, and certify containers to ensure availability to support the nuclear weapons mission. **FY 2018-FY 2021** • First production delivery of DPP-1 and DPP-3 containers by 2020; • Continue to provide container refurbishment, reconditioning, and annual maintenance and certification.	• No significant changes.
Long Term Stewardship $52,215,000	**Long Term Stewardship $50,061,000**	**Long Term Stewardship -$2,154,000**
• Funds Long Term Stewardship (LTS) activities at four NNSA sites to operate and maintain environmental remedial systems, perform monitoring and analysis of environmental media	• Supports Long Term Stewardship (LTS) regulatory required activities at the Kansas City National Security Campus, Lawrence Livermore National	• No significant changes.

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs FY 2016
to ensure compliance with Federal and state requirements, re-evaluate activities for consistency with regulatory revisions and technology, and works with the Federal and state agencies and stakeholders in executing the LTS activities in a cost-effective, compliant, and safe manner. • KC meets regulatory requirements by continuing to treat contaminated ground water, performing monitoring of surface and ground water, and complete the installation of a replacement treatment system. It also provides for corrective action required in the KC Resource Conservation and Recovery Act 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 meet 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, implement Institutional Controls agreement with offsite landowner, and new injections wells for effluent reinjection at Site 300; and enhanced source area remediation tests at Main Site. • Pantex meets regulatory requirements by continuing to treat contaminated ground water via pump and treat in-situ bioremediation systems. It also supports performing monitoring of ground water, and operating and maintaining landfill remedies. • SNL meets regulatory requirements by continuing to support environmental monitoring of surface water, ground water, and soil. It also	Laboratory (Main Site and Site 300), Pantex Plant, and Sandia National Laboratories. • 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, and 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. **FY 2018-FY 2021** • Treat and monitor legacy contamination at KC, LLNL Main Site, LLNL Site 300, Pantex Plant, and SNL to maintain compliance with all Federal and state regulations. • Performing Comprehensive Environmental Response, Compensation, and Liability Act CERCLA and Resource Conservation and Recovery Act (RCRA) 5-year remedy reviews of selected cleanup remedies at Pantex, LLNL Main Site, LLNL Site 300, and SNL.	

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs FY 2016
provides 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 2017-FY 2021 Infrastructure and Operations site allocations for direct-funded maintenance are provided in Table 4 below.

This program also funds the maintenance portion of the Roof Asset Management Program (RAMP). 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 is being expanded to other common components/systems under the Asset Management Program (AMP). A pilot AMP for Heating, Ventilating, and Air Conditioning (HVAC) systems will be implemented in FY 2016 and other systems will be analyzed as possible AMPs to achieve additional efficiencies.

FY 2018-FY 2021 Key Milestones

In the outyears, funding will continue to support the direct maintenance activities at NNSA sites across the nuclear security enterprise.

Table 4

National Nuclear Security Administration Infrastructure and Operations Direct Funded Maintenance and Repair of Facilities Allocations by Site ($dollars in thousands)							
Site	**FY 2015**	**FY 2016**	**FY 2017**	**FY 2018**	**FY 2019**	**FY 2020**	**FY 2021**
Kansas City National Security Campus	$24,512	$21,904	$26,500	$28,000	$29,000	$28,000	$29,000
Lawrence Livermore National Laboratory	$6,697	$6,697	$12,500	$13,000	$13,000	$13,000	$13,000
Los Alamos National Laboratory	$52,576	$49,068	$54,000	$54,000	$54,000	$52,000	$52,000
Nevada National Security Site	$18,413	$20,000	$20,000	$21,000	$21,000	$20,000	$21,000
Pantex Plant	$39,947	$48,055	$53,000	$57,000	$68,000	$65,000	$70,000
Sandia National Laboratories	$4,695	$2,000	$3,500	$3,500	$3,500	$3,500	$3,500
Savannah River Site	$17,043	$18,932	$22,000	$22,000	$22,000	$22,000	$22,500
Y-12 National Security Complex	$39,292	$59,000	$57,000	$61,000	$71,000	$68,000	$72,500
Enterprise Acquisitions*	$23,825	$51,344	$45,500	$45,500	$45,500	$43,500	$44,500
TOTAL	**$227,000**	**$277,000**	**$294,000**	**$305,000**	**$327,000**	**$315,000**	**$328,000**

* 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.

Activities and Explanation of Changes

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs FY 2016
Maintenance and Repair of Facilities $277,000,000	**Maintenance and Repair of Facilities $294,000,000**	**Maintenance and Repair of Facilities +$17,000,000**
• Continues 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, funds maintenance of equipment and tenant improvement equipment, and Bannister Road surveillance and maintenance. o At Pantex, funds Bays and Cell maintenance, emerging requirements, and common site support. o At SNL, funds space charge share to support maintenance activities. o At SRS, funds maintenance on tritium facilities and associated equipment and activities associated with gas transfer systems. o At Y-12, funds repairs of identified structural deficiencies in mission essential facilities, fire system surveillances and repairs. o At LANL, funds maintenance activities at PF-4, CMR, DARHT, LANSCE, Beryllium, waste management, radiological laboratory, and tritium facilities.	• Specifically, o At KC, funds maintenance of equipment and tenant improvement equipment, Bannister Road surveillance and maintenance until the property is transferred during FY 2017. 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 equipment maintenance activities. 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 HVAC-AMP 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, and stabilize the condition of excess facilities.

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs FY 2016
o At NNSS, funds maintenance of JASPER BEEF, DAF, and U1a. o At LLNL, funds maintenance activities at Contained Firing Facility, Superblock, HEAF, HE machine shops, and waste management facilities.	**FY 2018-FY 2021** • In the outyears, funding will continue to support the direct maintenance activities at NNSA sites across the nuclear security enterprise.	

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 general purpose infrastructure to reduce overall operating costs. It also reduces safety, environmental, and program risk associated with facilities and systems that are well beyond their design life. The Capabilities 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, resulting in surveillance and maintenance cost avoidance and reduced risk to workers, the public, the environment, and programs. This subprogram also funds the betterments portion of the Roof and HVAC Asset Management Programs (RAMP and HVAC-AMP respectively). In support of sustainability and energy performance goals, Recapitalization projects will include energy conservation measures to the greatest extent practicable.

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 Life Extension Programs (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 the major system acquisition projects (TEC > $750M), the OPCs are accounted for within the line item. Also, for scientific facilities such as U1a Complex Enhancements Project, the OPCs are requested within the RDT&E element which the project supports.

Tables 5 and 6 show the plans for Recapitalization projects to be executed with FY 2017 funding based on the status of enterprise infrastructure as of February 2016. This plan may need to be updated before the FY 2017 execution year to adjust to changing infrastructure conditions.

FY 2018-FY 2021 Key Milestones

Continue to provide highest priority improvements to facilities and improve safety, reliability and working conditions.

Table 5

National Nuclear Security Administration Infrastructure and Safety Planned FY 2017 Recapitalization Projects - As of February 2016		
Site	**Project Name**	**FY 2017 Allocation ($K)**
KC	Gas Transfer Production and Special Machine Area Capital Equipment Replacement	$4,231
	Bannister Road Disposition	$200,000
Subtotal Kansas City National Security Campus		**$204,231**
LLNL	B827D HE Synthesis Pilot Plant Renovation	$1,800
	HED Physics Precision Target MicroMachining Consolidation	$3,650
	B151 Hood Replacements in 4 Radiochemistry Laboratories	$3,750
	HEAF Fume Hood Exhaust (FHE) Ventilation System Replacement	$3,800
	Superblock Electrical Building System Upgrade	$3,500
	B121 Upgrade for additional Classified Office Space	$4,000
	Site 300 Firing Site Support Systems Upgrade	$5,000
	B280 Characterization	$2,000
Subtotal Lawrence Livermore National Laboratory		**$27,500**
LANL	HE Complex ESH&Q Facility System Upgrades and Replacements	$2,290
	TA-55 Criticality Safety Upgrades	$3,500
	TA-55 Active Confinement Ventilation Upgrades	$11,000
	Beryllium Technology Facility Safety Compliance Upgrades	$900
	CMR Facility Safety Compliance Upgrades	$2,395
	Non-Nuclear Classified Machine Shops Electrical Replacement	$400
	PF-4 Safety and Compliance System Upgrades	$2,500
	WETF Redundant Fire Detection Installation in Tritium Areas	$2,000
	Small Improvement Projects in 3 Facilities (53-003,22-0005, 03-0039)	$1,300
	RANT Seismic Upgrade	$6,340
	LANL HE Pressing Complex TA-16-430 Disposition	$4,800
Subtotal Los Alamos National Laboratory		**$37,425**
NNSS	DAF Fire Suppression Lead-In Replacement	$9,700
	U1a Fire Protection Installation	$3,800
	DAF Electric and Backup Power Replacement	$2,000
	Mission Corridor Consolidation	$6,300
	Mercury Complex Consolidation	$4,700
Subtotal Nevada National Security Site		**$26,500**
PX	Sitewide Fire Alarm Control Panel Replacements	$3,000
	Gas Lab Facility Replacement	$4,989
	FS-10 Electrical Upgrade	$800
	Bay & Cell RAMS, FDS, & Lead-In Improvements	$32,700
Subtotal Pantex Plant		**$41,489**

Site	Project Name	FY 2017 Allocation ($K)
SNL	B862 (Standby Power Plant) Upgrades	$5,500
	B827 (Primary Standards Laboratory) Renovation	$6,000
	TA-1 Domestic Water and Fire Protection Lines Replacement	$2,560
	Seven Small WPI Projects	$500
	B6588 (Annular Core Research Reactor) Facility Renovation	$5,000
Subtotal Sandia National Laboratories		**$19,560**
SRS	234-7H Air Handling Units Replacement	$3,115
	Reservoir Storage Vault Relocation	$6,385
	HANM Obsolete Oxygen Monitor Replacements	$4,060
	Reservoir Finishing Relocation from 234-H to 233-H	$1,840
	General Workplace Improvements	$550
Subtotal Savannah River Site		**$15,950**
Y-12	Power Distribution System Conversion from 161kV to 13.8kV	$5,500
	Bldg 9204-2E Elevator #1 Replacement	$3,000
	Bldg 9215 and 9212 Wet Pipe System 50 Year Sprinkler Head Replacements	$10,000
	Bldg 9720-5 Criticality Accident Alarm System Replacement	$6,700
	Bldg 9204-2 Ceiling Concrete Replacement	$5,500
	Nuclear Facility Electrical Modernization	$17,900
	Bldg 9111 and 9112 Disposition	$4,000
	Bldg 9201-5 Alpha-5 (includes 9201-5W) Risk Reduction	$17,000
	Bldg 9204-4 Beta-4 Risk Reduction	$20,000
Subtotal Y-12 National Security Complex		**$89,600**
	Planning, Assessments, and Infrastructure Management Tools	$48,788
	Construction Other Project Costs (OPC)	$3,600
	Deactivation of Aging and Obsolete Facilities to reduce Operations, Maintenance, and Recapitalization requirements	$40,000
Grand Total Infrastructure and Safety		**$554,643**

Table 6

National Nuclear Security Administration Capabilities Based Investments (CBI) Planned FY 2017 Recapitalization Allocations - as of February 2016		
Site	**Project Name**	**Project Cost ($K)**
KC	Developmental Laboratory Equipment & Capabilities Upgrades	$400
	Special Application Machining Equipment & Capabilities Upgrades	$800
	Gas Transfer System Production Equipment & Capabilities Upgrades	$2,370
Subtotal Kansas City Plant		**$3,570**
LANL	Environmental Testing Capability Investments for B61 and other LEPs (ARMAG)	$530
	TA-55 Wet Vacuum Material Handling System	$2,125
	Weather Enclosure at DARHT	$3,445
	DARHT Reliability/Capability Upgrades	$3,000
	Assembly Complex Capability Upgrades	$2,300
Subtotal Los Alamos National Laboratory		**$11,400**
LLNL	LEP and Warhead Assessment Investments	$6,580
	Insensitive High Explosives Qualification Capabilities Recapitalization	$2,000
	HE Synthesis Pilot Plant	$5,500
	Refurbish Vault and Radiochemistry Archival Equipment	$900
Subtotal Lawrence Livermore National Laboratory		**$14,980**
NNSS	DAF Sub-Critical Experiment (SCE) Support – Refurbish Radiography Capabilities	$1,000
	JASPER Modifications for Advanced Pu Experimental Capabilities	$1,000
	U1a SCE Support Investments – Develop Neutron Diagnosed SCE Capability	$3,700
	Stockpile Stewardship Infrastructure - Experimental Support Facilities Mods	$2,000
	DAF Material Staging Capability Upgrades	$1,570
Subtotal Nevada National Security Site		**$9,270**
PX	Special Nuclear Material (SNM) Workstation Upgrade	$870
	Equipment for Mock High Explosives Manufacturing	$1,080
	Reconfigure Production Bay for Non-Destructive Laser Gas Sampling (W88 ALT370)	$3,600
	Replace Equipment Skids for 300' Environmental Chambers for HE Formulation	$1,200
	Replace Machine Tools and Equipment for Special Tooling Fabrication	$1,400
	Re-establish HE Machining Capabilities	$3,540
	Linear Accelerator Replacement	$630
	Upgrade Cabinet Computed Tomography (CT) Unit	$560
	Replace 2 300' Environmental Chambers, Skids, and Controller in the NDE Lab	$1,400
	Lifecycle Replacement of HE Machine Tools	$700
Subtotal Pantex Plant		**$14,980**
SNL	Sandia Silicon Fabrication Revitalization (SSiFR)	$24,280
Subtotal Sandia National Laboratories		**$24,280**
SRS	Loading Line 6 Upgrades to Support LEPs and Major Alts	$4,280
Subtotal Savannah River Site		**$4,280**

Site	Project Name	Project Cost ($K)
Y-12	Parts Cleaning for Direct Lithium Material Manufacturing (DMM)	$4,000
	Install Wet Chemistry Process Capability	$1,210
	161210 Coordinate Measuring Machine (Alpha 5N)	$1,060
	Sheet Metal Polisher	$1,150
	9 MeV Part Positioner & Hydroform Refurbishment	$1,140
Subtotal Y-12 National Security Complex		**$8,560**
	Planning, Design, and Assessments	$10,689
	DP Line Item Construction Other Project Costs (OPCs)	$10,630
Grand Total		**$112,639**

Activities and Explanation of Changes

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs FY 2016
Infrastructure and Safety $253,724,000	**Infrastructure and Safety $554,643,000**	**Infrastructure and Safety +$300,919,000**
• Provides funds for needed investments in obsolete/aging facilities and infrastructure to improve safety, reliability and working conditions. • Table 1 in the FY 2016 President's Budget contains the proposed FY 2016 project plan as of December 2014. 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.	• Table 5 contains the current FY 2017 project plan as of February 2016. 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. **FY 2018-FY 2021** • Continues to provide highest priority improvements to facilities and improve safety, reliability and working conditions. • Provides funding for needed investments in obsolete/aging facilities and infrastructure to improve facilities, safety, reliability, and working conditions.	• The majority of the increase supports the transfer of the Kansas City Bannister Federal Complex; increased investments for upgrading aging infrastructure to address safety and programmatic risks, improve productivity, and lower operating costs; and the disposition of aging and obsolete facilities that are no longer needed.
Capabilities Based Investments $98,800,000	**Capabilities Based Investments $112,639,000**	**Capabilities Based Investments +$13,839,000**
• CBI continues to provide targeted, strategic investments for life-extension and modernization of enduring requirements needed to sustain Defense Program's capabilities. CBI provides funding to implement projects across the nuclear security enterprise including continued investments to: support LEP assessment at LLNL, support the B61 LEP environmental testing needs at LANL, revitalize silicon fabrication capabilities at SNL, and support Defense Program's mission across the nuclear security enterprise. Additional FY 2016 projects include: o At LLNL, investment in insensitive high explosive qualification capabilities.	• 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 2017 project plan as of February 2016. • CBI provides funding to implement projects across the nuclear security enterprise including continued investments to: support LEP assessments and Insensitive High Explosives (IHE) capabilities at LLNL, support LEP environmental testing needs at LANL, 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-	• Funding increases for capabilities supporting weapons life extension programs (LEPs) and major alterations. • Planning and conceptual design for CBI projects moves from Strategic Materials Sustainment to the CBI subprogram in FY 2017.

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs FY 2016
o At NNSS, equipment and facilities for subcritical experiments at the Device Assembly Facility and U1a Complex. o At Pantex, investment in work stations, production tooling, and diagnostic equipment to support weapons life extension activities. o At Y-12, investment in lithium material manufacturing capabilities and equipment to support LEP activities. • CBI will provide funding for most Defense Programs' other project costs (OPCs) for line item construction projects.	12, and support Defense Programs' mission across the nuclear security enterprise. Additional FY 2017 projects include: o At Kansas City National Security Complex, modernization of equipment and capabilities on production lines supporting B61-12 LEP and W88 Alteration 370. o At Nevada Nuclear Security Site, increased investment in capabilities supporting subcritical experiments at U1a. o At Pantex, investment in a non-destructive laser gas sampling facility. o At SRS, replacement and upgrade of function test station equipment. • CBI will continue funding for Defense Programs' OPCs for line item construction projects. **FY 2018-FY 2021** • Continues to provide targeted, strategic investments for life-extension and modernization of enduring requirements needed to sustain DP's capabilities. CBI will provide funding to implement projects across the nuclear security enterprise including continued investments to support projects initiated in previous fiscal years, including investments to support warhead assessments and Insensitive High Explosive capabilities at LLNL, B61 environmental testing capabilities at LANL, subcritical experiment support at NNSS, gas transfer systems at SRS, investment in silicon fabrication revitalizations at SNL, and tools and equipment supporting LEP activities at Pantex and Y-12. • Continue funding of Defense Programs' other project costs (OPCs) for line item construction projects.	

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs FY 2016
	• Through the outyear funding profile (FYNSP), CBI will successfully manage and execute targeted capability investments across the enterprise by applying previously successful program management practices. Increases in program funding in FY2017 and beyond are consistent with feedback from field representatives regarding the need for capability investments at each site.	

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.

FY 2017 funds will be used to complete facility designs and for construction of approved subprojects for the UPF at Y-12. Following construction of the UPF building and installation of required support systems, installation of uranium processing equipment is phased and prioritized to move critical capabilities out of Building 9212 at Y-12 as soon as practicable.

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, a Salvage and Accountability Building, a Mechanical Electrical Building, 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.

Requested FY 2017 funding will be used to continue design of the TA-55 Reinvestment Project III and the final design and begin construction of the Transuranic Liquid Waste Treatment Facility project at LANL. Under the CMRR Project, FY 2017 construction funding includes funding for subprojects reflected in the CMRR project data sheet (04-D-125), 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). In support of the Enhancements for Subcritical Experiments (ECSE) portfolio, FY 2017 funding will commence work on the U1a Complex Enhancements Project (UCEP) at NNSS.

The funding Request for FY 2017 supports the LLNL Expand Electrical Distribution System project. Existing electrical systems are at capacity and have substantial distribution imbalances based on the power demands from mission growth over the last 50 years. Additionally, system components no longer meet current safety requirements. Completion of this project will provide reliable and efficient electrical distribution systems with sufficient electrical capacity to support national security missions.

Requested FY 2017 funding will also support the design 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. Other active general purpose infrastructure projects during the FY 2017 execution year include construction of the Emergency Operations Center at Y-12 and replacement of the TA-3 substation at LANL.

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 three projects will exceed the $3,000,000 threshold:

1. Lithium Production Facility at the Y-12 National Security Complex
2. Tritium Production Capability Upgrade Project at the Savannah River Site

The rough-order of magnitude cost estimates to complete the conceptual design is between $7,000,000 and $8,000,000 for each of the above planned projects. NNSA plans to request design funds in FY 2018 for the Tritium Production Capability and Lithium Production Facility in FY 2019.

Table 7

National Nuclear Security Administration Infrastructure and Operations Construction by Line-Item (dollars in thousands)							
Site	**FY 2015**	**FY 2016**	**FY 2017**	**FY 2018**	**FY 2019**	**FY 2020**	**FY 2021**
19-D-xxx, Zone 11 High Pressure Fire Loop, PX	$0	$0	$0	$0	$10,000	$12,000	$29,000
19-D-xxx, 138K Power Distribution System Replacement, NNSS	$0	$0	$0	$0	$15,000	$30,000	$20,000
19-D-xxx, Lithium Production Facility, Y-12	$0	$0	$0	$0	$28,500	$34,500	$53,000
18-D-xxx, Fire Station, Y-12	$0	$0	$0	$20,000	$0	$0	$0
18-D-xxx, Tritium Production Capability, SRS	$0	$0	$0	$6,800	$25,505	$49,500	$13,000
17-D-640, U1a Complex Enhancements Project, NNSS	$0	$0	$11,500	$22,100	$63,000	$35,000	$19,900
17-D-630, Expand Electrical Distribution System, LLNL	$0	$0	$25,000	$0	$0	$0	$0
16-D-621, TA-3 Substation Replacement, LANL	$0	$25,000	$0	$0	$0	$0	$0
16-D-515, Albuquerque Complex Project	$0	$8,000	$15,047	$50,000	$0	$0	$0
15-D-613, Emergency Operations Center, Y-12	$2,000	$17,919	$2,000	$0	$0	$0	$0
15-D-612, Emergency Operations Center, LLNL	$0	$0	$0	$20,000	$0	$0	$0
15-D-611, Emergency Operations Center, SNL	$0	$0	$0	$0	$40,000	$0	$0
15-D-302, TA-55 Reinvestment Project, Phase 3, LANL	$16,062	$18,195	$21,455	$23,300	$17,500	$12,996	$0
15-D-301, HE Science & Engineering Facility, PX	$11,800	$0	$0	$0	$0	$0	$0
12-D-301, TRU Waste Facilities, LANL	$6,938	$0	$0	$0	$0	$0	$0
11-D-801, TA-55 Reinvestment Project, Phase 2, LANL	$10,000	$3,903	$0	$0	$0	$0	$0
07-D-220, Radioactive Liquid Waste Treatment Facility Upgrade Project, LANL	$0	$11,533	$0	$0	$0	$0	$0
07-D-220-04, Transuranic Liquid Waste Facility, LANL	$7,500	$40,949	$17,053	$8,995	$0	$0	$0
06-D-141, Uranium Processing Facility, Y-12	$335,000	$430,000	$575,000	$620,000	$620,000	$620,000	$635,000
Chemistry and Metallurgy Replacement (CMRR)							
04-D-125, Chemistry and Metallurgy Research Replacement Project, LANL	$35,700	$0	$159,615	$180,900	$216,095	$239,600	$294,000
04-D-125-04 RLUOB Equipment Installation, Phase 2	$0	$117,000	$0	$0	$0	$0	$0
04-D-125-05 PF-4 Equipment Installation	$0	$38,610	$0	$0	$0	$0	$0
Subtotal, 04-D-125 CMRR Project, LANL	$35,700	$155,610	$159,615	$180,900	$216,095	$239,600	$294,000
Total, Infrastructure and Operations: Construction	**$425,000**	**$711,109**	**$826,670**	**$952,095**	**$1,035,600**	**$1,033,596**	**$1,063,900**

Activities and Explanation of Changes

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs FY 2016
Construction $711,109,000	**Construction $826,670,000**	**Construction +$115,561,000**
• Commence 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). • Continue design, subprojects and site preparation activities for UPF at Y-12. • Continue construction of TRP-II, Phase C subproject and the Radioactive Liquid Waste Treatment Facility's, (RLWTF) Low Level Liquid Waste, (LLW) subproject at LANL. • Continue design of the TA-55 Reinvestment Project (TRP) Phase III, and the Transuranic Liquid Waste (TLW) Facility Projects at LANL. Continue design and start construction activities in the first quarter of FY 2017 for the EOC at Y-12. • Start 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 LANL projects: TRU Waste Facility, the TA-55 Reinvestment Project II, Phase C, and the RLWTF LLW Treatment Facility subproject. • Continue design efforts for TRP III and the TLW Facility at LANL and start procuring long-lead items for the TLW Facility. • Continue design activities and construction of approved subproject for UPF at Y-12. • Initiate design and construction of the U1a Complex Enhancements Project at NNSS. • Initiate design and construction of the Expand Electrical Distribution System Project at LLNL. • Continue design and initiate construction of the Albuquerque Complex Project. **FY 2018-FY 2021** • FY 2018: start design activities for the Tritium Production Capability; start design and construction of the EOC at LLNL and the Fire Station at Y-12; continue Albuquerque Complex project; start physical construction for the TLW Facility Project at LANL. • FY 2019: start design activities for the Lithium Production Facility; start design and construction of the EOC at SNL, the New 138K Power Transmission Event Corridor at NNSS, and the Zone 11 High Pressure Fire Loop at Pantex.	• The increase is attributable to UPF funding to ensure project is completed within $6,500,000,000 by FY 2025; fully funds design and construction of the Expand Electrical Distribution System LLNL; initiates design and construction of the U1a Complex Enhancements Project; funds design completion and construction initiation for the Albuquerque Complex Project and TLW Facility Project. The increases are partially offset by reductions in the TLW Facility and RLWTF's LLW funding.

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs FY 2016
	• Start construction of TA-55 Reinvestment Phase III at LANL.	

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 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021
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	85% of availability	85% of availability	85% of availability	85% of availability
Result	98.6						
Endpoint Target	Mission critical facilities are available at least 85% of scheduled days annually.						
Maintenance – Percentage of preventative maintenance (PM) spending vs total maintenance (TM).							
Target	N/A	40%	42%	44%	46%	48%	50%
Result	N/A						
Endpoint Target	PM to TM ratio target is 50%.						
Recapitalization – Percentage of NNSA assets rated adequate (by Replacement Plant Value).							
Target	N/A	39%	40%	41%	42%	43%	44%
Result	N/A						
Endpoint Target	44% of NNSA assets rated as adequate.						

	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021
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	95% of deliverables	95% of deliverables	95% of deliverables	95% of deliverables
Result	100						
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. Note: The Environmental Projects and Operations (EPO) has been renamed Long-Term Stewardship and has been moved from the Site Stewardship program to the Infrastructure and Operations program, formerly named Readiness in Technical Base and Facilities (RTBF), starting in FY 2016.						
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	90% of projects	90% of projects	90% of projects	90% of projects
Result	90						
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.						

Infrastructure and Operations
Capital Summary

(Dollars in Thousands)

	Total	Prior Years	FY 2015 Enacted	FY 2015 Current	FY 2016 Enacted	FY 2017 Request	FY 2017 vs FY 2016
Capital Operating Expenses Summary (including (Major Items of Equipment (MIE))							
Capital Equipment >$500K (including MIE)	N/A	N/A	17,500	18,872	23,850	27,251	+3,401
Plant Projects (GPP) (<$10M)	N/A	N/A	74,600	61,308	66,775	97,670	+30,895
Total, Capital Operating Expenses	**N/A**	**N/A**	**92,100**	**80,180**	**90,625**	**124,921**	**+34,296**
Capital Equipment > $500K (including MIE)							
Total Non-MIE Capital Equipment (>$500K)	N/A	N/A	2,900	3,472	8,450	7,381	-1,069
LANSCE Refurbishment, LANL	19,848	11,348	8,500	8,500	0	0	+0
LINAC, Device Assembly Facility, NNSS	4,000	2,100	1,100	1,900	0	0	+0
Jig Borer (5 Axis Milling Machine), LLNL	2,600	0	2,600	2,600	0	0	+0
Verson Hydro-Form Press, LLNL	2,400	0	2,400	2,400	0	0	+0
Mass Properties Measurement Machine, PX	3,200	0	0	0	3,200	0	-3,200
Coordinate Measuring Machine, Y-12	3,260	0	0	0	2,200	1,060	-1,140
HE Synthesis Pilot Plant, LLNL	9,500	0	0	0	4,000	5,500	+1,500
Parts Cleaning for Direct Lithium Material Manufacturing, Y-12	10,000	0	0	0	2,000	4,000	+2,000
Molecular Beam Epitaxy Tool, SNL	8,000	0	0	0	4,000	4,000	+0
Reestablish HE Machining Capabilities, PX	6,870	0	0	0	0	3,540	+3,540
LINAC Replacement, PX	4,810	0	0	0	0	630	+630
9 MeV Part Positioner and Hydroform Refurb, Y-12	2,515	0	0	0	0	1,140	+1,140
Total, Capital Equipment (including MIE)	**77,003**	**13,448**	**17,500**	**18,872**	**23,850**	**27,251**	**+3,401**

	(Dollars in Thousands)						
	Total	Prior Years	FY 2015 Enacted	FY 2015 Current	FY 2016 Enacted	FY 2017 Request	FY 2017 vs FY 2016
Plant Projects (GPP and IGPP) (Total Estimated Cost (TEC) <$10M)							
Total Plant Projects (GPP) (Total Estimated Cost (TEC) <$5M)	N/A	N/A	7,200	8,500	14,185	33,465	+24,965
Facility Modifications (White Space Expansion) to Support Weapons Production, KC	8,000	0	12,000	6,300	1,700		-1,700
Site 300 Firing Site Support Systems Upgrade, LLNL	5,000	0	0	0	0	5,000	+5,000
Dynamic Equation of State Facilities Modernization, LANL	7,500	0	1,000	1,000	6,500	0	-6,500
RANT Seismic Upgrades, LANL	7,840	0	0	0	1,500	6,340	+4,840
CSI - Hill 200 Electrical Replacement, NNSS	8,613	113	1,500	1,500	7,000	0	-7,000
DAF Electric and Backup Power Replacement, NNSS	9,200	0	1,000	1,000	6,200	2,000	-4,200
Mission Corridor Consolidation, NNSS	6,300	0	0	0	0	6,300	+6,300
Electrical/Mechanical Building 12-75, PX	9,212	1,112	600	8,100	0	0	+0
Gas Lab Facility Replacement, PX	9,989	0	0	0	5,000	4,989	-11
Electrical/Mechanical Upgrades Building 12-126, PX	0	0	9,200	0	0	0	+0
B6588 (Annular Core Research Reactor) Facility Renovation, SNL	5,000	0	0	0	0	5,000	+5,000
C914 Seismic Upgrades to Achieve Code Compliance, SNL	9,800	0	0	0	500	0	-500
B827 (Primary Standards Laboratory) Renovation, SNL	6,500	0	0	0	500	6,000	+5,500
B862 (Standby Power Plant) Upgrades, SNL	8,500	0	0	0	3,000	5,500	+2,500
B870 (Neutron Generator Production) Refurbishments, SNL	6,500	0	3,400	500	6,000	0	-6,000
B905 (Explosives Components) Addition and Renovation, SNL	9,553	353	9,200	9,200	0	0	+0
TTR 03-57 (Control Tower) Utility Tower Addition, SNL	6,600	300	6,300	6,300	0	0	+0
234-7H Air Handler Units Replacement, SRS	8,010	2,955	2,200	2,200	1,260	1,595	+335
Reservoir Storage Vault Relocation, SRS	7,846	0	2,000	1,400	1,820	4,626	+2,806
Building 9204-2 Kathabar #2 Replacement , Y-12	8,100	0	1,400	2,100	6,000	0	-6,000
NFEM 9204-2E Switchgear 814 Replacement, Y-12	5,000	0	0	0	0	5,000	+5,000
Vacuum Chamber Upgrades, PX	2,608	0	7,000	2,608	0	0	+0
Modify Unloading Station B, SRS	6,500	0	5,500	5,500	1,000	0	-1,000

(Dollars in Thousands)

	Total	Prior Years	FY 2015 Enacted	FY 2015 Current	FY 2016 Enacted	FY 2017 Request	FY 2017 vs FY 2016
Environmental Testing Capability Investments for B61 and other LEPs (ARMAG), LANL	7,630	0	5,100	5,100	2,000	530	-1,470
Weather Enclosure at DARHT, LANL	7,890	0	0	0	1,000	3,445	+2,445
Non-Destructive Laser Gas Sampling, PX	6,710	0	0	0	1,610	3,600	+1,990
Load Line 6 Upgrades, SRS	8,500	0	0	0	0	4,280	+4,280
Function Test Station Programmable Controller System Upgrade, SRS	5,000	0	0	0	0	0	+0
Battery Test Facility, SNL	8,000	0	0	0	0	0	+0
Salt Drying Facility Modifications, Y-12	5,000	0	0	0	0	0	+0
Light Initiated High Explosive Test Facility, SNL	5,000	0	0	0	0	0	+0
Total, Plant Projects (GPP) (Total Estimated Cost (TEC) <$10M)	**N/A**	**N/A**	**74,600**	**61,308**	**66,775**	**97,670**	**+36,580**
Total, Capital Summary	**N/A**	**N/A**	**92,100**	**80,180**	**90,625**	**124,921**	**+39,981**

Outyears for Infrastructure and Operations

(Dollars in Thousands)

	FY 2018 Request	FY 2019 Request	FY 2020 Request	FY 2021 Request
Capital Operating Expenses Summary (including MIE)				
Capital Equipment >$500K (including MIE)	10,443	7,600	5,980	1,690
Plant Projects (GPP) (<$10M)	19,105	10,550	16,610	6,500
Total, Capital Operating Expenses	**29,548**	**18,150**	**22,590**	**8,190**
Capital Equipment > $500K (including MIE)				
Total Non-MIE Capital Equipment (>$500K)	0	0	1,440	1,060
Parts Cleaning for Direct Lithium Material Manufacturing, Y-12	3,000	1,000	0	0
Reestablish HE Machining Capabilities, PX	3,330	0	0	0
LINAC Replacement, PX	770	490	2,290	630
9 MeV Part Positioner and Hydroform Refurb, Y-12	1,375	0	0	0
Retrofit AG Davis Controller, Y-12	1,293	0	0	0
eCAD System - Alpha 1, Y-12	675	0	0	0
2 MeV Part Positioners, Y-12	0	1,825	0	0
Mid Energy Panels, Y-12	0	1,785	0	0
HE Large Charge Machining Recapitalization, LLNL	0	2,500	2,250	0
Total, Capital Equipment (including MIE)	**10,443**	**7,600**	**5,980**	**1,690**
Plant Projects (GPP) (Total Estimated Cost (TEC) <$10M)				
Total Plant Projects (GPP) (Total Estimated Cost (TEC) <$5M)	300	3,300	5,700	2,000
C914 Seismic Upgrades to Achieve Code Compliance, SNL	9,300	0	0	0
Weather Enclosure at DARHT, LANL	3,445	0	0	0
Non-Destructive Laser Gas Sampling, PX	1,500	0	0	0
Load Line 6 Upgrades, SRS	4,220	0	0	0
Function Test Station Programmable Controller System Upgrade, SRS	340	2,700	1,960	0
Battery Test Facility, SNL	0	650	7,350	0
Salt Drying Facility Modifications, Y-12	0	3,900	1,100	0
Light Initiated High Explosive Test Facility, SNL	0	0	500	4,500
Total, Plant Projects (GPP) (Total Estimated Cost (TEC) <$10M)	**19,105**	**10,550**	**16,610**	**6,500**
Total, Capital Summary	**29,548**	**18,150**	**22,590**	**8,190**

Construction Projects Summary

(Dollars in Thousands)

	Total	Prior Years	FY 2015 Enacted	FY 2015 Current	FY 2016 Enacted	FY 2017 Request	FY 2017 vs FY 2016
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)	4,700	0	0	0	0	500	+500
TPC, 19-D-xxx, Zone 11 High Pressure Fire Loop, PX	**85,700**	**0**	**0**	**0**	**0**	**500**	**+500**
19-D-xxx, 138K Power Distribution System Replacement, NNSS							
TEC	65,000	0	0	0	0	0	0
OPC	2,800	0	0	0	0	500	+500
TPC, 19-D-xxx, 138K Power Distribution System Replacement, NNSS	**67,800**	**0**	**0**	**0**	**0**	**500**	**+500**
19-D-xxx, Lithium Production Facility, Y-12							
TEC	650,000	0	0	0	0	0	0
OPC	70,000	0	2,000	2,000	3,800	1,600	-2,200
TPC, 19-D-xxx, Lithium Production Facility, Y-12	**720,000**	**0**	**2,000**	**2,000**	**3,800**	**1,600**	**-2,200**
18-D-xxx, Fire Station, Y-12							
TEC	20,000	0	0	0	0	0	0
OPC	3,235	0	1,235	1,235	500	700	+200
TPC, 18-D-xxx, Fire Station, Y-12	**23,235**	**0**	**1,235**	**1,235**	**500**	**700**	**+200**
18-D-xxx, Tritium Production Capability, SRS							
TEC	240,000	0	0	0	0	0	0
OPC	60,000	0	2,000	2,000	3,300	1,100	-2,200
TPC, 18-D-xxx, Tritium Production Capability, SRS	**300,000**	**0**	**2,000**	**2,000**	**3,300**	**1,100**	**-2,200**

	(Dollars in Thousands)						
	Total	Prior Years	FY 2015 Enacted	FY 2015 Current	FY 2016 Enacted	FY 2017 Request	FY 2017 vs FY 2016
17-D-640, U1a Complex Enhancements Project, NNSS							
TEC	151,500	0	0	0	0	11,500	+11,500
OPC [a]	26,069	0	0	0	0	0	0
TPC, 17-D-640, U1a Complex Enhancements Project, NNSS	**177,569**	**0**	**0**	**0**	**0**	**11,500**	**+11,500**
17-D-630, Expand Electrical Distribution System, LLNL							
TEC	25,000	0	0	0	0	25,000	+25,000
OPC	2,400	1,000	392	392	8	100	+92
TPC, 17-D-630, Expand Electrical Distribution System, LLNL	**27,400**	**1,000**	**392**	**392**	**8**	**25,100**	**+25,092**
16-D-621, TA-3 Substation Replacement, LANL							
TEC	25,000	0	0	0	25,000	0	-25,000
OPC	3,650	873	600	600	750	600	-150
TPC, 16-D-621, TA-3 Substation Replacement, LANL	**28,650**	**873**	**600**	**600**	**25,750**	**600**	**-25,150**
16-D-515, Albuquerque Complex Project							
TEC	168,600	0	0	0	8,000	15,047	+7,047
OPC [b]	27,900	0	0	0	2,500	0	-2,500
TPC, 16-D-515, Albuquerque Complex Project	**196,500**	**0**	**0**	**0**	**10,500**	**15,047**	**+4,547**
15-D-613, Emergency Operations Center, Y-12							
TEC	21,919	0	2,000	2,000	17,919	2,000	-15,919
OPC	4,250	1,300	700	700	750	500	-250
TPC, 15-D-613, Emergency Operations Center, Y-12	**26,169**	**1,300**	**2,700**	**2,700**	**18,669**	**2,500**	**-16,169**
15-D-612, Emergency Operations Center, LLNL							
TEC	20,000	0	0	0	0	0	0
OPC	2,892	392	0	0	500	500	0
TPC, 15-D-612, Emergency Operations Center, LLNL	**22,892**	**392**	**0**	**0**	**500**	**500**	**0**

[a] U1a Complex Enhancements Project OPCs are funded under Advanced Radiography within the Science Program.

[b] In FY 2015, $190,000 in OPCs for the Albuquerque Complex Project were funded within the NNSA Federal Salaries and Expenses appropriation.

(Dollars in Thousands)

	Total	Prior Years	FY 2015 Enacted	FY 2015 Current	FY 2016 Enacted	FY 2017 Request	FY 2017 vs FY 2016
15-D-611, Emergency Operations Center, SNL							
TEC	40,000	0	0	0	0	0	0
OPC	2,100	700	0	0	0	200	+200
TPC, 15-D-611, Emergency Operations Center, SNL	**42,100**	**700**	**0**	**0**	**0**	**200**	**+200**
15-D-302, TA-55 Reinvestment Project Phase III, LANL							
TEC	141,508	0	16,062	16,062	18,195	21,455	+3,260
OPC	31,500	4,500	3,000	3,000	3,000	3,000	0
TPC, 15-D-302, TA-55 Reinvestment Project Phase III, LANL	**173,008**	**4,500**	**19,062**	**19,062**	**21,195**	**24,455**	**+3,260**
15-D-301, HE Science and Engineering Facility, PX							
TEC	11,800	0	11,800	11,800	0	0	0
OPC	2,640	2,540	100	100			0
TPC, 15-D-301, HE Science and Engineering Facility, PX	**14,440**	**2,540**	**11,900**	**11,900**	**0**	**0**	**0**
12-D-301, TRU Waste Facilities, LANL							
TEC	83,990	77,052	6,938	6,938	0	0	0
OPC	22,874	15,270	3,580	3,580	3,322	702	-2,620
TPC, 12-D-301, TRU Waste Facilities, LANL	**106,864**	**92,322**	**10,518**	**10,518**	**3,322**	**702**	**-2,620**
11-D-801, TA-55 Reinvestment Project, Phase II, LANL							
TEC	97,464	83,561	10,000	10,000	3,903	0	-3,903
OPC	14,462	9,214	1,208	1,208	3,015	1,025	-1,990
TPC, 11-D-801, TA-55 Reinvestment Project, Phase II, LANL	**111,926**	**92,775**	**11,208**	**11,208**	**6,918**	**1,025**	**-5,893**
10-D-501, Nuclear Facility Risk Reduction, Y-12							
TEC	65,796	65,776	0	0	0	0	0
OPC	10,000	7,798	1,224	1,224	978	0	-978
TPC, 10-D-501, Nuclear Facility Risk Reduction, Y-12	**75,796**	**73,574**	**1,224**	**1,224**	**978**	**0**	**-978**

	(Dollars in Thousands)						
	Total	Prior Years	FY 2015 Enacted	FY 2015 Current	FY 2016 Enacted	FY 2017 Request	FY 2017 vs FY 2016
08-D-802, High Explosive Pressing Facility, PX							
TEC	140,397	123,276	0	0	0	0	0
OPC	4,829	3,089	400	400	1,000	340	-660
TPC, 08-D-802, High Explosive Pressing Facility, PX	**145,226**	**126,365**	**400**	**400**	**1,000**	**340**	**-660**
07-D-220, Radioactive Liquid Waste Treatment Facility Upgrade, LANL							
TEC	101,639	90,106	0	0	11,533	0	-11,533
OPC	17,488	12,620	868	868	3,741	259	-3,482
TPC, 07-D-220, Radioactive Liquid Waste Treatment Facility Upgrade, LANL	**119,127**	**102,726**	**868**	**868**	**15,274**	**259**	**-15,015**
07-D-220-04, Transuranic Liquid Waste Facility, LANL							
TEC	85,102	10,605	7,500	7,500	40,949	17,053	-23,896
OPC	10,428	3	654	654	2,061	1,500	-561
TPC, 07-D-220-04, Transuranic Liquid Waste Facility, LANL	**95,530**	**10,608**	**8,154**	**8,154**	**43,010**	**18,553**	**-24,457**
06-D-141, Uranium Processing Facility, Y-12							
TEC	5,983,000	1,104,968	335,000	335,000	430,000	574,500	+144,500
OPC	517,000	120,128	0	0	0	500	+500
TPC, 06-D-141, Uranium Processing Facility, Y-12	**6,500,000**	**1,225,096**	**335,000**	**335,000**	**430,000**	**575,000**	**+145,000**
04-D-125, Chemistry and Metallurgy Research Replacement, LANL							
TEC	2,307,297	821,272	35,700	35,700	146,610	143,000	-3,610
OPC	570,006	126,511	0	0	9,000	16,615	+7,615
TPC, 04-D-125, Chemistry and Metallurgy Research Replacement, LANL	**2,877,303**	**947,783**	**35,700**	**35,700**	**155,610**	**159,615**	**+4,005**
Total All Construction Projects							
TEC	10,526,012	2,376,616	425,000	425,000	702,109	809,555	+107,446
OPC	1,411,223	305,938	17,961	17,961	38,225	30,241	-7,984
TPC All Construction Projects	**11,937,235**	**2,682,554**	**442,961**	**442,961**	**740,334**	**839,796**	**+99,462**

Outyears to Completion for Infrastructure and Operations Construction

(Dollars in Thousands)

	FY 2018 Request	FY 2019 Request	FY 2020 Request	FY 2021 Request	Outyears to Completion
19-D-xxx, Zone 11 High Pressure Fire Loop, PX					
Total Estimated Cost (TEC)	0	10,000	12,000	29,000	30,000
Other Project Cost (OPC)	500	750	750	1,000	1,200
TPC, 19-D-xxx, Zone 11 High Pressure Fire Loop, PX	**500**	**10,750**	**12,750**	**30,000**	**31,200**
19-D-xxx, 138K Power Distribution System Replacement, NNSS					
TEC	0	15,000	30,000	20,000	0
OPC	500	700	700	400	0
TPC, 19-D-xxx, 138K Power Distribution System Replacement, NNSS	**500**	**15,700**	**30,700**	**20,400**	**0**
19-D-xxx, Lithium Production Facility, Y-12					
TEC	0	28,500	34,500	53,000	534,000
OPC	1,900	3,000	0	3,000	54,700
TPC, 19-D-xxx, Lithium Production Facility, Y-12	**1,900**	**31,500**	**34,500**	**56,000**	**588,700**
18-D-xxx, Fire Station, Y-12					
TEC	20,000	0	0	0	0
OPC	400	400	0	0	0
TPC, 18-D-xxx, Fire Station, Y-12	**20,400**	**400**	**0**	**0**	**0**
18-D-xxx, Tritium Production Capability, SRS					
TEC	6,800	25,505	49,500	13,000	145,195
OPC	2,300	3,000	120	3,000	45,180
TPC, 18-D-xxx, Tritium Production Capability, SRS	**9,100**	**28,505**	**49,620**	**16,000**	**190,375**
17-D-640, U1a Complex Enhancements Project, NNSS					
TEC	22,100	63,000	35,000	19,900	0
OPC [a]	0	0	0	0	0
TPC, 17-D-640, U1a Complex Enhancements Project, NNSS	**22,100**	**63,000**	**35,000**	**19,900**	**0**

[a] U1a Complex Enhancements Project OPCs are funded under Advanced Radiography within the Science Program.

	(Dollars in Thousands)				
	FY 2018 Request	FY 2019 Request	FY 2020 Request	FY 2021 Request	Outyears to Completion
17-D-630, Expand Electrical Distribution System, LLNL					
TEC	0	0	0	0	0
OPC	200	500	200	0	0
TPC, 17-D-630, Expand Electrical Distribution System, LLNL	**200**	**500**	**200**	**0**	**0**
16-D-621, TA-3 Substation Replacement, LANL					
TEC	0	0	0	0	0
OPC	500	327	0	0	0
TPC, 16-D-621, TA-3 Substation Replacement, LANL	**500**	**327**	**0**	**0**	**0**
16-D-515, Albuquerque Complex Project, ABQ					
TEC	50,000	0	0	0	0
OPC	0	0	0	0	0
TPC, 16-D-515, Albuquerque Complex Project, ABQ	**50,000**	**0**	**0**	**0**	**0**
15-D-613, Emergency Operations Center, Y-12					
TEC	0	0	0	0	0
OPC	500	500	0	0	0
TPC, 15-D-613, Emergency Operations Center, Y-12	**500**	**500**	**0**	**0**	**0**
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	0	40,000	0	0	0
OPC	200	500	500	0	0
TPC, 15-D-611, Emergency Operations Center, SNL	**200**	**40,500**	**500**	**0**	**0**

	(Dollars in Thousands)				
	FY 2018 Request	FY 2019 Request	FY 2020 Request	FY 2021 Request	Outyears to Completion
15-D-302, TA-55 Reinvestment Project Phase III, LANL					
TEC	23,300	17,500	12,996	0	32,000
OPC	2,000	2,000	3,000	3,000	8,000
TPC, 15-D-302, TA-55 Reinvestment Project Phase III, LANL	**25,300**	**19,500**	**15,996**	**3,000**	**40,000**
07-D-220-04, Transuranic Liquid Waste Facility, LANL					
TEC	8,995	0	0	0	0
OPC	1,500	2,000	1,710	1,000	0
TPC, 07-D-220-04, Transuranic Liquid Waste Facility, LANL	**10,495**	**2,000**	**1,710**	**1,000**	**0**
06-D-141, Uranium Processing Facility, Y-12					
TEC	625,000	623,000	565,000	628,000	1,097,532
OPC	0	2,000	60,000	12,000	322,372
TPC, 06-D-141, Uranium Processing Facility, Y-12	**625,000**	**625,000**	**625,000**	**640,000**	**1,419,904**
04-D-125, Chemistry and Metallurgy Research Replacement, LANL					
TEC	163,900	166,095	143,815	260,000	426,905
OPC	17,000	50,000	95,785	34,000	221,095
TPC, 04-D-125, Chemistry and Metallurgy Research Replacement, LANL	**180,900**	**216,095**	**239,600**	**294,000**	**648,000**
Total All Construction Projects					
TEC	940,095	988,600	882,811	1,022,900	2,265,632
OPC	28,000	66,177	163,265	57,400	652,547
TPC All Construction Projects	**968,095**	**1,054,777**	**1,046,076**	**1,080,300**	**2,918,179**

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

1. 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 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 100 and 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 Total Project Cost (TPC) of $158,609 and a CD-4 scheduled for 3Q FY 2022.

17-D-640-010: Refuge Station Drift
Constructs the U1a.108 Refuge Station Drift and ventilation upgrades necessary to supply sufficient ventilation to support additional ECSE mining operations.

17-D-640-020: Mining and Infrastructure
Constructs ECSE drifts and installs the ventilation, mechanical, electrical, fire protection and life safety, control and diagnostics, and containment structures, systems, and components.

A Federal Project Director has not been assigned to this project.

ECSE is a portfolio of work employing advanced diagnostics needed to conduct subcritical hydrodynamic integrated weapons experiments using plutonium.
It includes three elements: (1) Line Item Construction - U1a Complex Enhancements Project (UCEP), (2) Major Item of Equipment (MIE) titled *Advanced Sources and Detectors* for an advanced radiographic system funded out of Advanced Radiography, and (3) future MIE for Neutron Diagnosed Subcritical Experiments (NDSE) technology also funded out of Advanced Radiography. UCEP will modify the U1a Complex to house the MIEs for the experiments and will provide the underground mined network (called drifts) and the supporting structures, systems, and components necessary for the deployment of the MIEs.

UCEP consists of two complete and usable subprojects. The first subproject, 17-D-640-010 will implement the U1a.108 Refuge Station Drift and ventilation upgrades necessary to supply sufficient ventilation to support mining operations. The second subproject 17-D-640-020 is the mining and ground support in the ECSE Area (U1a.102E, 104A, 106, and 107 drifts) and the installation of the ventilation, mechanical, electrical, fire protection and life safety, control and diagnostics, and containment structures, systems, and components. FY 2017 funding will be used for completing design and starting 17-D-640-010 construction, and for planning 17-D-640-020.

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.

2. 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 2017	09/25/2014	08/13/2015	1Q FY 2017	1Q FY 2019	2Q FY 2019	3QFY 2019	N/A	3Q FY 2022

17-D-640-010: Refuge Station Drift

(fiscal quarter or date)[b]

	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

17-D-640-020: Mining and Infrastructure

(fiscal quarter or date)[c]

	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

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

3. Project Cost History

	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

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

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

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

4. 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 ECSE Area to provide refuge and ventilation. This subproject is required to support any significant construction activity in the northern 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 underground areas and systems to provide MIE diagnostic/detector alcove drifts and mechanical equipment drifts. The project scope includes an experimental room with containment plugs for experiment execution, radiographic control system, radiographic monitoring diagnostics, ancillary systems (overhead handling systems, power, cooling, ventilation, spill mitigation, shielding, environmental barriers, etc.), and imaging systems.

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.

As outlined in the National Nuclear Security Administration (NNSA) 2016 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 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 (when assigned) 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 Radiography subprogram within RDT&E.

5. Financial Schedule[a]

17-D-640-010: Refuge Station Drift

(dollars in thousands)

	Appropriations	Plan	Obligations	Costs
Total Estimated Cost (TEC)				
Design				
FY 2017	N/A	2,700	N/A	2,700
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
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
Total, TEC	N/A	26,640	N/A	26,640
Other Project Cost (OPC)				
OPC except D&D				
FY 2015	N/A	281	N/A	281
FY 2016	N/A	700	N/A	700
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
Total, TPC	N/A	27,621	N/A	27,621

[a] OPCs are funded out of Advanced Radiography

17-D-640-020: Mining and Infrastructure

(dollars in thousands)

	Appropriations	Plan	Obligations	Costs
Total Estimated Cost (TEC)				
Design				
FY 2018	N/A	6,960	N/A	6,100
FY 2019	N/A	4,540	N/A	5,400
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	51,750
FY 2021	N/A	19,900	N/A	24,610
FY 2022	N/A	0	N/A	8,000
Total, Construction	N/A	113,360	N/A	113,360
TEC				
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	51,750
FY 2021	N/A	19,900	N/A	24,610
FY 2022	N/A	0	N/A	8000
Total, TEC	N/A	124,860	N/A	124,860
Other Project Cost (OPC)				
OPC except D&D				
FY 2015	N/A	728	N/A	728
FY 2016	N/A	1,900	N/A	1,400
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	1300
Total, OPC except D&D	N/A	6,128	N/A	6,128
Total Project Cost (TPC)				
FY 2015	N/A	728	N/A	728
FY 2016	N/A	1,900	N/A	1,400
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	51,750
FY 2021	N/A	19,900	N/A	24,610
FY 2022	N/A	0	N/A	8,000
Total, TPC	N/A	130,988	N/A	130,988

Total Project

	(dollars in thousands)			
	Appropriations	Plan	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
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	51,750
FY 2021	N/A	19,900	19,900	24,610
FY 2022	N/A	0	0	8,000
Total, Construction	N/A	137,300	137,300	137,300
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	51,750
FY 2021	19,900	19,900	19,900	24,610
FY 2022	0	0	0	8,000
Total, TEC	151,500	151,500	151,500	151,500
Other Project Cost (OPC)				
OPC except D&D				
FY 2015	1,009	1,009	1,009	1,009
FY 2016	2,600	2,600	2,600	2,100
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	1,300
Total, OPC except D&D	7,109	7,109	7,109	7,109
Total Project Cost (TPC)				
FY 2015	1,009	1,009	1,009	1,009
FY 2016	2,600	2,600	2,600	2,100

(dollars in thousands)

	Appropriations	Plan	Obligations	Costs
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	42,840
FY 2020	35,000	35,000	35,000	51,750
FY 2021	19,900	19,900	19,900	24,610
FY 2022	0	0	0	8,000
Total, TPC	158,609	158,609	158,609	158,609

6. Details of Project Cost 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	N/A	N/A
Project Management	500	N/A	N/A
Contingency	400	N/A	N/A
Total, Design	2,700	N/A	N/A
Construction			
Construction	18,340	N/A	N/A
Construction Management	900	N/A	N/A
Contingency	4,700	N/A	N/A
Total, Construction	23,940	N/A	N/A
Total, TEC	26,640	N/A	N/A
Contingency, TEC	5,100	N/A	N/A
Other Project Cost (OPC)			
OPC except D&D			
Conceptual Planning	200	N/A	N/A
Conceptual Design	281	N/A	N/A
Other OPCs including AB, Security, and PM Reviews	400		
Contingency	100	N/A	N/A
Total, OPC except D&D	981	N/A	N/A
Contingency, OPC Except D&D	100	0	0
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	N/A	N/A
Contingency, OPC	100	N/A	N/A
Total, TPC	27,621	N/A	N/A
Total, Contingency	5,200	N/A	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	N/A	N/A
Project Management	1,900	N/A	N/A
Contingency	1,800	N/A	N/A
Total, Design	11,500	N/A	N/A
Construction			
Construction	84,500	N/A	N/A
Construction Management	5,440	N/A	N/A
Contingency	23,420	N/A	N/A
Total, Construction	113,360	N/A	N/A
Total, TEC	124,860	N/A	N/A
Contingency, TEC	25,220	N/A	N/A
Other Project Cost (OPC)			
OPC except D&D			
Conceptual Planning	300	N/A	N/A
Conceptual Design	728	N/A	N/A
Other OPCs including AB, Security, and PM Reviews	4,800		
Contingency	300	N/A	N/A
Total, OPC except D&D	6,128	N/A	N/A
Contingency, OPC Except D&D	300	0	0
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	N/A	N/A
Contingency, OPC	300	N/A	N/A
Total, TPC	130,988	N/A	N/A
Total, Contingency	25,520	N/A	N/A

Total Project

(dollars in thousands)

	Current Total Estimate	Previous Total Estimate	Original Validated Baseline
Total Estimated Cost (TEC)			
Design	9,600	N/A	N/A
Project Management	2,400	N/A	N/A
Contingency	2,200	N/A	N/A
Total, Design	14,200	N/A	N/A
Construction			
Construction	102,840	N/A	N/A
Construction Management	6,340	N/A	N/A
Contingency	28,120	N/A	N/A
Total, Construction	137,300	N/A	N/A
Total, TEC	151,500	N/A	N/A
Contingency, TEC	30,320	N/A	N/A
Other Project Cost (OPC)			
OPC except D&D			
Conceptual Planning	500	N/A	N/A
Conceptual Design	1009	N/A	N/A
Other OPCs including AB, Security, and PM Reviews	5200		
Contingency	400	N/A	N/A
Total, OPC except D&D	7,109	N/A	N/A
Contingency, OPC Except D&D	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	N/A	N/A
Contingency, OPC	400	N/A	N/A
Total, TPC - UCEP	158,609	N/A	N/A
Total, Contingency	30,720	N/A	N/A

7. Schedule of Appropriation Requests

(dollars in thousands)

Request		Prior Years	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	Outyears	Total
FY 2017	TEC	0	0	11,500	22,100	63,000	35,000	19,900	0	151,500
	OPC	1,009	2,600	1,700	1,000	800		0	0	7,109
	TPC	1,009	2,600	13,200	23,100	63,800	35,000	19,900		158,609

8. Related Operations and Maintenance Funding Requirements

Beneficial Occupancy for Installation of MIE (fiscal quarter or date)	4QFY 2020
Expected Useful Life (number of years)	30
Expected Future Start of D&D of this capital asset (fiscal quarter)	4QFY 2053

(Related Funding requirements)

(dollars in thousands)

	Annual Costs		Life Cycle Costs	
	Current Total Estimate	Previous Total Estimate	Current Total Estimate	Previous Total Estimate
Operations	TBD	N/A	TBD	N/A
Utilities	TBD	N/A	TBD	N/A
Maintenance & Repair	TBD	N/A	TBD	N/A
Total	TBD	N/A	TBD	N/A

9. D&D Information

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

10. Acquisition Approach

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

1. 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 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 for the Lawrence Livermore National Laboratory (LLNL) scope is $16,500 to $27,400.

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 2017 will be used for a detailed design and specification for construction and starting construction under a fixed price design build contract.

2. 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	2QFY 2017	N/A	4Q FY 2019

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/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

	Performance Baseline Validation
FY 2017	2QFY 2017

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

3. Project Cost History[a]
($ 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

4. 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 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.

5. Financial Schedule

(dollars in thousands)

	Appropriations	Plan	Obligations	Costs
Total Estimated Cost (TEC)				
Design				
FY 2017	N/A	2,000	N/A	1,500
FY 2018	N/A	0	N/A	500
Total, Design	N/A	2,000	N/A	2,000
Construction				
FY 2017	N/A	23,000	N/A	12,000
FY 2018	N/A	0	N/A	9,500
FY 2019	N/A	0	N/A	1,000
FY 2020	N/A	0	N/A	500
Total, Construction	N/A	23,000	N/A	23,000
TEC				
FY 2017	25,000	25,000	25,000	13,500
FY 2018	0	0	0	10,000
FY 2019	0	0	0	1,000
FY 2020	0	0	0	500
Total, TEC	25,000	25,000	25,000	25,000
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	392	392	392	0
FY 2016	8	8	8	400
FY 2017	100	100	100	100
FY 2018	200	200	200	200
FY 2019	500	500	500	500
FY 2020	200	200	200	200
Total, OPC except D&D	2,400	2,400	2,400	2,400
D&D				
FY 2017	N/A	N/A	N/A	N/A
Total, D&D	N/A	N/A	N/A	N/A
OPC				
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	392	392	392	0
FY 2016	8	8	8	400
FY 2017	100	100	100	100
FY 2018	200	200	200	200

(dollars in thousands)

	Appropriations	Plan	Obligations	Costs
FY 2019	500	500	500	500
FY 2020	200	200	200	200
Total, OPC	2,400	2,400	2,400	2,400
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	392	392	392	0
FY 2016	8	8	8	400
FY 2017	25,100	25,100	25,100	13,600
FY 2018	200	200	200	10,200
FY 2019	500	500	500	1,500
FY 2020	200	200	200	700
Total, TPC	27,400	27,400	27,400	27,400

6. Details of Project Cost Estimate

	(dollars in thousands)		
	Current Total Estimate	Previous Total Estimate	Original Validated Baseline
Total Estimated Cost (TEC)			
Design			
Design	1,500	N/A	N/A
Contingency	500	N/A	N/A
Total, Design	2,000	N/A	N/A
Construction			
Site Work	500	N/A	N/A
Construction	20,000	N/A	N/A
Contingency	2,500	N/A	N/A
Total, Construction	23,000	N/A	N/A
Total, TEC	25,000	N/A	N/A
Contingency, TEC	3,000	N/A	N/A
Other Project Cost (OPC)			
OPC except D&D			
Conceptual Planning	250	N/A	N/A
Conceptual Design	750	N/A	N/A
Hot startup	500	N/A	N/A
Other OPC Costs	500	N/A	N/A
Contingency	400	N/A	N/A
Total, OPC except D&D	2,400	N/A	N/A
D&D *(if any)*			
D&D	N/A	N/A	N/A
Total, D&D	N/A	N/A	N/A
Total, OPC	2,400	N/A	N/A
Contingency, OPC	400	N/A	N/A
Total, TPC	27,400	N/A	N/A
Total, Contingency	3,400	N/A	N/A

7. Schedule of Appropriation Requests

($K)

Request		Prior Years	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	Outyears	Total
FY 2017	TEC	0	0	25,000	0	0	0	0	0	25,000
	OPC	1,392	8	100	200	500	200	0	0	2,400
	TPC	1,392	8	25,100	200	500	200	0	0	27,400

8. Related Operations and Maintenance Funding Requirements

Start of Operation or Beneficial Occupancy (fiscal quarter or date)	4Q FY 2019
Expected Useful Life (number of years)	40
Expected Future Start of D&D of this capital asset (fiscal quarter)	4Q FY 2059

(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	N/A	20,000	N/A
Utilities	N/A	N/A	N/A	N/A
Maintenance & Repair	500	N/A	20,000	N/A-
Total	1,000	N/A	40,000	N/A

9. D&D Information

There is no new area being constructed in this project.

10. 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

1. Significant Changes and Summary

Significant Changes
This Construction Project Data Sheet (CPDS) is new; but the project is not a new start for the budget year.

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 and reduces the footprint by approximately 10%. This project also provides for D&D of approximately 312,000 gross square feet (GSF) of existing facilities, with 15,499 GSF to be returned to the Air Force.

The current estimated Total Project Cost, based on a Class 5, rough order of magnitude estimate, is $196,500 while the FY 2017 FYNSP includes $75,737 for the project (including FY 2015 and FY 2016 funding). In FY 2016, DOE will complete an independent cost estimate. NNSA will examine both the requirements and cost estimate during the initial design phase to determine what funding will be included in the FY 2018 Budget Request.

2. 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

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

	Performance Baseline Validation
FY 2017	2Q FY 2017

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

3. 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

Funding amounts in the table above represent amounts for the current cost estimate of the project. An independent cost estimate will provide further opportunities to refine requirements and reduce the cost of the facility.

4. Project Scope and Justification

Scope

This project will provide between 279,000 and 295,000 GSF of office space for approximately 1,200 employees. The project will be constructed on DOE property in Albuquerque, New Mexico adjacent to the Kirtland Air Force Base east perimeter fence on Eubank Avenue. The project includes the cost for decommissioning 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 project will include approximately 22,000 square feet of vault type rooms and/or Sensitive Compartmented Information Facility (SCIF) space, and will provide standard office furnishings as well as video teleconferencing equipment. The new buildings will be design to LEED Gold Standards. Move costs and a parking lot (for 800 personal vehicles and 10 government vehicles) are also included in the scope.

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. The NNSA has a long-term commitment at this installation, and it will remain the primary field support office for the NNSA/HQ.

The NNSA Albuquerque Office currently occupies 327,428 GSF in 23 buildings originally constructed in 1951 as enlisted barracks. The existing complex is beyond its designed life and does not meet the needs of the NNSA. The four-story barrack 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."[b] The Albuquerque Complex has a deferred maintenance backlog of $52 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.

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

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

5. Financial Schedule

Amounts in this table represent only what is programmed in the FYNSP, rather than amounts for the current estimate of total project cost. An independent cost estimate will provide further opportunities to refine requirements and reduce the cost of the facility.

(dollars in thousands)

	Appropriations	Plan	Obligations	Costs
Total Estimated Cost (TEC)				
Design				
FY 2016	N/A	8,000	N/A	7,500
FY 2017	N/A	6,700	N/A	7,200
Total, Design	N/A	14,700	N/A	14,700
Construction				
FY 2017	N/A	8,347	N/A	7,500
FY 2018	N/A	50,000	N/A	28,000
FY 2019	N/A	0	N/A	22,847
FY 2020	N/A	0	N/A	0
Total, Construction	N/A	58,347	N/A	58,347
TEC				
FY 2016	8,000	8,000	8,000	7,500
FY 2017	15,047	15,047	15,047	14,700
FY 2018	50,000	50,000	50,000	28,000
FY 2019	0	0	0	22,847
FY 2020	0	0	0	0
Total, TEC	73,047	73,047	73,047	73,047
Other Project Cost (OPC)				
OPC except D&D				
FY 2015[a]	190	190	190	190
FY 2016	2,500	2,500	2,500	2,500
FY 2017	0	0	0	0
FY 2018	0	0	0	0
FY 2019	0	0	0	0
FY 2020	0	0	0	0
Total, OPC except D&D	2,690	2,690	2,690	2,690
D&D				
FY 2020	0	0	0	0
FY 2021	0	0	0	0
Total, D&D	0	0	0	0
OPC				
FY 2015	190	190	190	190
FY 2016	2,500	2,500	2,500	2,500

[a] OPCs in FY 2015 were funded from the NNSA Federal Salaries and Expenses appropriation.

(dollars in thousands)

	Appropriations	Plan	Obligations	Costs
FY 2017	0	0	0	0
FY 2018	0	0	0	0
FY 2019	0	0	0	0
FY 2020	0	0	0	0
FY 2021	0	0	0	0
Total, OPC	2,690	2,690	2,690	2,690
Total Project Cost (TPC)				
FY 2015	190	190	190	190
FY 2016	10,500	10,500	10,500	10,000
FY 2017	15,047	15,047	15,047	14,700
FY 2018	50,000	50,000	50,000	28,000
FY 2019	0	0	0	22,847
FY 2020	0	0	0	0
FY 2021	0	0	0	0
Total, TPC	75,737	75,737	75,737	75,737

6. Details of Project Cost Estimate

The current total estimate is based on the project's estimate, not funding that NNSA is requesting in the FY 2017 FYNSP. An independent cost estimate will provide further opportunities to refine requirements and reduce the cost of the facility.

	(dollars in thousands)		
	Current Total Estimate	Previous Total Estimate	Original Validated Baseline
Total Estimated Cost (TEC)			
Design			
Design	14,200	N/A	N/A
Contingency	500	N/A	N/A
Total, Design	14,700	N/A	N/A
Construction			
Site Work	12,700	N/A	N/A
Construction	126,000	N/A	N/A
Contingency	15,200	N/A	N/A
Total, Construction	153,900	N/A	N/A
Total, TEC	168,600		
		N/A	N/A
Contingency, TEC	15,700	N/A	N/A
Other Project Cost (OPC)			
OPC except D&D			
Conceptual Planning	890	N/A	N/A
Conceptual Design	1,200	N/A	N/A
Startup	1,000	N/A	N/A
Contingency	600	N/A	N/A
Total, OPC except D&D	3,690	N/A	N/A
D&D *(if any)*			
D&D	21,900	N/A	N/A
Contingency	2,310	N/A	N/A
Total, D&D	24,210	N/A	N/A
Total, OPC	27,900	N/A	N/A
Contingency, OPC	2,910	N/A	N/A
Total, TPC	196,500	N/A	N/A
Total, Contingency	18,610	N/A	N/A

7. Schedule of Appropriation Requests

(dollars in thousands)

Request		Prior Years	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	Outyears	Total
FY 2017	TEC	0	8,000	15,047	50,000	0	0	0	0	73,047
	OPC	190	2,500	0	0	0	0	0	0	2,690
	TPC	190	10,500	15,047	50,000	0	0	0	0	75,737

8. Related Operations and Maintenance Funding Requirements

Start of Operation or Beneficial Occupancy (fiscal quarter or date)	2QFY 2020
Expected Useful Life (number of years)	40
Expected Future Start of D&D of this capital asset (fiscal quarter)	1QFY 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	1,550	N/A	62,000	N/A
Utilities	3,375	N/A	135,300	N/A
Maintenance & Repair	2,000	N/A	80,000	N/A
Total	6,925	N/A	277,300	N/A

9. 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	279,000 – 295,000
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"	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	312,000

This project will provide a reduction of approximately 30,000 square feet, meeting the "one-for-one" requirements. Characterization will be initiated in FY 2019 with abatement/D&D commencing once personnel are moved into the new facility. Completion of D&D is expected 1QFY 2021.

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

10. Acquisition Approach

Design and construction contracts will be acquired through full and open competition; 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.

15-D-613, Emergency Operations Center, Y-12
Y-12 National Security Complex, Oak Ridge, Tennessee
Project is for Design and Construction

1. Significant Changes and Summary

Significant Changes
This Construction Project Data Sheet (CPDS) is an update of the Fiscal Year (FY) 2016 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 has been delayed by roughly six months. In turn, the design complete and CD-4 milestones have also been revised. The Total Estimated Cost (TEC) has been increased by $1,919 and the Other Project Costs (OPC) have been increased by $900 to reflect the revised estimate and risks identified during the Analysis of Alternatives completed in November 2015.

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 First 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.

FY 2017 funding will be held in reserve for contingency.

2. 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

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 schedules are only estimates and consistent with the high end of the schedule ranges.

3. 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	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

4. Project Scope and Justification

Scope

The final scope will be established at the time the project CD-2/3 is approved. 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 10,000 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

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.

5. 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	1,666
FY 2017	N/A	0	N/A	1,254
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	328
FY 2018	N/A	0	N/A	7,726
FY 2019	N/A	0	N/A	9,782
FY 2020	N/A	0	N/A	327
FY 2021	N/A	0	N/A	836
Total, Construction	N/A	18,999	N/A	18,999
TEC				
FY 2015	2,000	2,000	2,000	0
FY 2016	17,919	17,919	17,919	1,666
FY 2017	2,000	2,000	2,000	1,582
FY 2018	0	0	0	7,726
FY 2019	0	0	0	9,782
FY 2020	0	0	0	327
FY 2021	0	0	0	836
Total, TEC	21,919	21,919	21,919	21,919
Other Project Cost (OPC)				
OPC				
FY 2014[a]	1,300	1,300	1,300	824
FY 2015	700	700	700	1,048
FY 2016	750	750	750	878
FY 2017	500	500	500	500
FY 2018	500	500	500	500
FY 2019	500	500	500	500
Total, OPC	4,250	4,250	4,250	4,250
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	2,544
FY 2017	2,500	2,500	2,500	2,082
FY 2018	500	500	500	8,226
FY 2019	500	500	500	10,282
FY 2020	0	0	0	327

[a] The CPDS provided in the FY 2016 congressional budget justification incorrectly listed FY 2014 OPC costs as $1,300.

	(dollars in thousands)			
	Appropriations	Plan	Obligations	Costs
FY 2021	0	0	0	836
Total, TPC	26,169	26,169	26,169	26,169

6. Details of Project Cost Estimate

	(dollars in thousands)		
	Current Total Estimate	Previous Total Estimate	Original Validated Baseline
Total Estimated Cost (TEC)			
Design			
Design	2,539	3,300	N/A
Contingency	381	700	N/A
Total, Design	2,920	4,000	N/A
Construction			
Site Work	705	500	N/A
Equipment	420	500	N/A
Construction	12,872	13,000	N/A
Contingency	5,002	2,000	N/A
Total, Construction	18,999	16,000	N/A
Total, TEC	21,919	20,000	N/A
Contingency, TEC	5,383	2,700	N/A
Other Project Cost (OPC)			
OPC except D&D			
Conceptual Planning	1,020	1,350	N/A
Conceptual Design	400	400	N/A
Start-Up	551	600	N/A
Other OPC Costs	1,910	500	N/A
Contingency	369	500	N/A
Total, OPC except D&D	4,250	3,350	N/A
Total, OPC	4,250	3,350	N/A
Contingency, OPC	369	500	N/A
Total, TPC	26,169	23,350	N/A
Total, Contingency	5,752	3,200	N/A

7. Schedule of Appropriation Requests

($K)

Request		Prior Years	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	Outyears	Total
FY 2015	TEC	2,000	2,000	16,000	0	0	0	0	0	20,000
	OPC	900	250	500	500	200	150	0	0	2,500
	TPC	2,900	2,250	16,500	500	200	150	0	0	22,500
FY 2016	TEC	2,000	17,919	0	0	0	0	0	0	19,919
	OPC	1,750	250	500	500	200	150	0	0	3,350
	TPC	3,700	18,169	500	500	200	150	0	0	23,269
FY 2017	TEC	2,000	17,919	2,000	0	0	0	0	0	21,919
	OPC	2,000	750	500	500	500	0	0	0	4,250
	TPC	4,000	18,669	2,500	500	500	0	0	0	26,169

8. Related Operations and Maintenance Funding Requirements

Start of Operation or Beneficial Occupancy (fiscal quarter or date)	1QFY 2021
Expected Useful Life (number of years)	30
Expected Future Start of D&D of this capital asset (fiscal quarter)	1QFY 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	N/A	712	N/A
Utilities	171	N/A	4,930	N/A
Maintenance & Repair	46	N/A	2,443	N/A
Total	217	N/A	8,085	N/A

9. 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 1,092,697 sq. ft. 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……	10,000
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"……	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

10. Acquisition Approach

Various alternatives are being considered with respect to this project. The alternatives being considered are Federal led or utilizing the current management and operating (M&O) contractor.

- Design-Bid-Build (design with option to build) contract execution strategy for the building construction.
- Design-Procurement-Build subcontract for the specialty systems design, installation, and integration.
- Site forces for design and construction of building utilities and interfaces to the existing plant infrastructure.

15-D-302, TA-55 Reinvestment Project (TRP) Phase III
Los Alamos National Laboratory (LANL), Los Alamos, New Mexico
Project is for Design and Construction

1. Significant Changes and Summary

Significant Changes

This Construction Project Data Sheet (CPDS) is an update from the Fiscal Year (FY) 2016 CPDS and does not include a new start for the budget year.

The conceptual design evaluated three potential upgrades that were approved as part of the mission need and not previously executed as part of TRP I and TRP II. These include: 1) replacing the Fire Panels and Devices; 2) upgrading the PF-4 ventilation to Active Confinement System, and 3) removing non-nuclear buildings within the TA-55 from the safety Class Fire Water Loop.

The scope of the project will be determined at CD-1 following a federally led Analysis of Alternatives. However, based on analysis to date and competing priorities within NNSA, the Request assumes the scope of the project will be limited to disconnecting the TA-55 office buildings from the safety class fire loop and limiting the fire panels and devices replacement to only critical elements that would make the system compliant with the national codes and standards. The scope associated with the ventilation system upgrade was to support the implementation of the Defense Nuclear Facilities Safety Board (DNFSB) Recommendations 2009-2. As required by DOE Standard 1189, "Integration of Safety into Design Process," upgrading of the ventilation system was determined to be a "Major Modification" requiring development of a series of safety basis documents, reviews, and approvals through the Critical Decision (CD) 4. The cost and time to develop these documents and the delay that would result in completing TRP III was determined to be significantly higher than the resulting benefit of reducing of the off-site dose to the public, the intended purpose of Defense Nuclear Facility Safety Board (DNFSB) recommendation. The goal of reducing off-site dose to the public can be achieved through ongoing safety and seismic upgrades of PF-4 and reducing materials at risk. Necessary component replacements for the ventilation systems will be made through normal maintenance and repair. This approach has been agreed to by the DNFSB.

Based on these changes, the anticipated CD-4 date is fourth quarter of FY 2025. A design-build approach will be proposed during the development of the CD-1 package to potentially reduce the cost and schedule. The estimated top range of the anticipated scope is $173,008.

The most recent DOE O 413.3B approved Critical Decision (CD) for the overall project is CD-0 that was approved on March 23, 2005, with a pre-conceptual design Total Project Cost Range of $125,000 to $195,000. Since the CD-0 approval, the project was split into three projects, TRP I, TRP II and TRP III.

A Federal Project Director has not been assigned to this project, but one will be assigned upon CD-1 approval.

2. Critical Milestone History

	CD-0	Conceptual Design Complete	CD-1	CD-2	Final Design Complete	CD-3	D&D Complete	CD-4
FY 2015	03/23/2005		1Q FY 2015	4Q FY 2017	2Q FY 2018	2Q FY 2018	NA	4Q FY 2022
FY 2016	03/23/2005	12/23/2014	4Q FY 2016	4Q FY 2018	2Q FY 2018	4Q FY 2018	NA	3Q FY 2026
FY 2017	03/23/2005	12/23/2014	4Q FY 2016	4Q FY 2018	2Q FY 2018	4Q FY 2018	NA	4Q FY 2025

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 Project 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

3. Project Cost History

	TEC, Design	TEC, Construction	TEC, Total	OPC Except D&D	OPC, D&D	OPC, Total	TPC
FY 2015	30,062	110,000	140,062	29,500	NA	29,500	169,562
FY 2016	30,060	150,002	180,062	46,500	NA	46,500	226,562
FY 2017	30,060	111,448	141,508	31,500	NA	31,500	173,008

4. Project Scope and Justification

Scope
The conceptual design evaluated the following three upgrades that were approved as part of the mission need, were not previously executed as part of TRP I and TRP II; but which support the implementation of the Defense Nuclear Facilities Safety Board Recommendations 2009-2:

1. Replacing fire suppression systems, upgrading fire alarm panels, wiring and devices;
2. Upgrading PF-4 ventilation system; and
3. Removing TA-55 Office Buildings from the Fire Water Loop.

The anticipated scope of the project will be disconnecting the TA-55 office buildings from the safety class fire loop and limiting the fire panels and devices replacement to only critical elements that would make the system compliant with the national codes and standards., .

FY 2017 funding will be used to prepare request for proposals for construction subcontract.

Justification
The Plutonium Faciltiy-4 (PF-4) within Technical Area (TA) 55 is a Hazard Category 2 nuclear facility. The mission need for the TRP III is driven by the fact that PF-4 proposed upgrades are planned in the only NNSA facility authorized to produce plutonium pits for the enduring stockpile. PF-4 has been in operation for over 35 years and, before the TRP I and TRP II upgrades, the infrastructure and systems were aging and approaching the end of their service life, required excessive

maintenance, and experienced increased operating costs and reduced system reliability. And the facility is not in compliance with increases in safety and regulatory requirements that are required for the fire protection systems, confinement ventilation, and fire water distribution. TRP III is the final phase of the three-phase project that will upgrade PF-4 within the TA-55 boundary at LANL.

There were three potential subprojects for TRP III that were evaluated in conceptual design, ventilation system upgrades, fire water loop upgrades, and replacement of fire alarm panels and devices. The subproject(s) and the alternative(s) will be approved at CD-1. For the fire water loop, the alternatives include installation of ML-4 fire water system for the office buildings to installation/modification of safety class fire water loop for the plutonium facility. The status quo was not found as a viable option for fire panel replacement, therefore, only one alternative was evaluated for replacement of the fire alarm panel and devices because the current system is not compliant with the National Fire Protection codes. Although a wide-range of alternatives were evaluated to upgrade the ventilation systems to a safety-class, active confinement system, the cost and time it would take to upgrade the system would not result in a commensurate reduction in the off-side dose to the public below the reduction that could be achieved by the ongoing safety and seismic upgrades of PF-4. The TA-55 Office Buildings will be disconnected from the safety class fire water loop to improve fire protection for the PF-4 during a fire. These evaluations will be validated during the federally led Analysis of Alternatives and prior to the commencement of the CD-1 package.

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 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.

5. Financial Schedule

(dollars in thousands)

	Appropriations	Plan	Obligations	Costs
Total Estimated Cost (TEC)				
Design				
FY 2015	N/A	16,062	N/A	0
FY 2016	N/A	13,998	N/A	3,000
FY 2017	N/A	0	N/A	22,000
FY 2018	N/A	0	N/A	5,060
Total, Design	N/A	30,060	N/A	30,060
Construction				
FY 2016	N/A	4,197		0
FY 2017	N/A	21,455	N/A	0
FY 2018	N/A	23,300	N/A	10,000
FY 2019	N/A	17,500	N/A	15,000
FY 2020	N/A	12,996	N/A	35,000
FY 2021	N/A	0	N/A	35,000
FY 2022	N/A	32,000	N/A	15,000
FY 2023	N/A	0	N/A	1,448
Total, Construction	N/A	111,448	N/A	111,448
TEC				
FY 2015	16,062	16,062	16,062	0
FY 2016	18,195	18,195	18,195	10,000
FY 2017	21,455	21,455	21,455	22,000
FY 2018	23,300	23,300	23,300	15,060
FY 2019	17,500	17,500	17,500	15,000
FY 2020	12,996	12,996	12,996	35,000
FY 2021	0	0	0	35,000
FY 2022	32,000	32,000	32,000	15,000
FY 2023	0	0	0	1,448
Total, TEC	141,508	141,508	141,508	141,508
Other Project Cost (OPC)				
OPC except D&D				
FY 2013	500	500	500	500
FY 2014	4,000	4,000	4,000	4,000
FY 2015	3,000	3,000	3,000	3,000
FY 2016	3,000	3,000	3,000	3,000

(dollars in thousands)

	Appropriations	Plan	Obligations	Costs
FY 2017	3,000	3,000	3,000	3,000
FY 2018	2,000	2,000	2,000	2,000
FY 2019	2,000	2,000	2,000	2,000
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
FY 2023	3,000	3,000	3,000	3,000
FY 2024	2,000	2,000	2,000	2,000
Total, OPC except D&D	31,500	31,500	31,500	31,500
Total Project Cost (TPC)				
FY 2013	500	500	500	500
FY 2014	4,000	4,000	4,000	4,000
FY 2015	19,062	19,062	19,062	3,000
FY 2016	21,195	21,195	21,195	6000
FY 2017	24,455	24,455	24,455	25000
FY 2018	25,300	25,300	25,300	17,060
FY 2019	19,500	19,500	19,500	17,000
FY 2020	15,996	15,996	15,996	38,000
FY 2021	3,000	3,000	3,000	38,000
FY 2022	35,000	35,000	35,000	18,000
FY 2023	3,000	3,000	3,000	4,448
FY 2024	2,000	2,000	2,000	2,000
Total TPC	173,008	173,008	173,008	173,008

6. Details of Project Cost Estimate

(dollars in thousands)

	Current Total Estimate	Previous Total Estimate	Original Validated Baseline
Total Estimated Cost (TEC)			
Design			
Design	23,560	23,560	NA
Federal Support	1,500	1,500	NA
Contingency	5,000	5,000	NA
Total, Design	30,060	30,060	NA
Construction			
Long Lead Procurements	0	8,000	NA
Equipment	0	6,002	NA
Construction	79,448	95,000	NA
Safety Basis	1,000	10,000	NA
Federal Support	2,000	2,000	NA
Contingency	29,000	29,000	NA
Total, Construction	111,448	150,002	NA
Total, TEC	141,508	180,062	NA
Contingency, TEC	34,000	34,000	NA
Other Project Cost (OPC)			
OPC except D&D			
Conceptual Planning	2,000	2,000	NA
Conceptual Design	7,000	8,000	NA
Start-Up	7,000	15,000	NA
Project Support	4,000	2,000	NA
Contingency	11,500	19,500	NA
Total, OPC except D&D	31,500	46,500	NA
Total, OPC	31,500	46,500	NA
Contingency, OPC	11,500	19,500	NA
Total, TPC	173,008	226,562	NA
Total, Contingency	45,500	53,500	NA

7. Schedule of Appropriation Requests

		Prior Years	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	Outyears	Total
FY 2015	TEC	16,062	38,000	33,000	31,000	10,000	10,000	2,000	0	140,062
	OPC	3,500	3,000	3,000	3,000	6,000	4,000	3,000	0	29,500
	TPC	19,562	41,000	36,000	34,000	16,000	14,000	5,000	0	169,562
FY 2016	TEC	16,062	18,195	21,455	23,300	17,500	12,996	30,554	40,000	180,062
	OPC	7,500	3,000	3,000	3,000	3,000	3,000	3,000	21,000	46,500
	TPC	23,562	21,195	24,455	26,300	20,500	15,996	33,554	94,554	226,562
FY 2017	TEC	16,062	18,195	21,455	23,300	17,500	12,996	0	32,000	141,508
	OPC	7,500	3,000	3,000	2,000	2,000	3,000	3,000	8,000	31,500
	TPC	23,562	21,195	24,455	25,300	19,500	15,996	3,000	40,000	173,008

8. Related Operations and Maintenance Funding Requirements

Start of Operation or Beneficial Occupancy (fiscal quarter or date)	NA
Expected Useful Life (number of years)	NA
Expected Future Start of D&D of this capital asset (fiscal quarter)	NA

(Related Funding requirements)

(dollars in thousands)

	Annual Costs		Life Cycle Costs	
	Current Total Estimate	Previous Total Estimate	Current Total Estimate	Previous Total Estimate
Operations	NA	NA	NA	NA
Utilities	NA	NA	NA	NA
Maintenance & Repair	NA	NA	NA	NA
Total	NA	NA	NA	NA

9. D&D Information

There is no new area being constructed in this construction project.

10. Acquisition Approach

The TRP III Acquisition Strategy is based on tailored procurement strategies in order to mitigate risks that are inherent in construction activities going on simultaneously with facility operations. The TRP III will be implemented via LANL-issued final design/construction contracts based on detailed performance requirements/specifications developed during the preliminary design phase.

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

1. Significant Changes and Summary

Significant Changes

This Construction Project Data Sheet (CPDS) is an update of the Fiscal Year (FY) 2016 CPDS and does not include a new start for the budget year.

There may be a need for procuring long-lead equipment items that could be purchased prior to award of the construction contract. These equipment items may be furnished as government furnished items to the construction contractor. In addition, the scope section is corrected to eliminate items that were included under the combined 07-D-220 Radioactive Liquid Waste Treatment Facility Upgrade Project data sheet.

The CD-4 date is delayed to 4Q FY 2021 because the design contract request for bids was delayed.

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. Costs and schedule will be adjusted as the design and safety basis progresses to completion and the CD-2 package is finalized.

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

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 and designated to produce pits for the enduring nuclear stockpile. Approval of the performance baseline will be granted upon the completion of the final design and approval of the Preliminary Documented Safety Analysis.

In FY 2017, the project will continue the design and safety basis analysis documents development, procure long-lead items, prepare construction bid packages, and conduct government sponsored reviews.

FY 2017 funding will be used for construction.

2. Critical Milestone History[a]

	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	4Q FY 2016	1Q FY 2017	1Q FY 2017	N/A	4Q FY 2020
FY 2015	10/04/2004		09/23/2013	4Q FY 2016	1Q FY 2017	2Q FY 2017	N/A	4Q FY 2020
FY 2016	10/04/2004	09/23/2013	09/23/2013[b]	4Q FY 2017	1Q FY 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

[a] The schedules are only estimates and consistent with the high end of the schedule ranges.
[b] Revised CD-1

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

(Fiscal Quarter or Date)
CD-3A

FY 2017: 4Q FY 2016
CD-3A: Approve long-lead procurement activities.

3. 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	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

4. Project Scope and Justification

Scope
The scope includes the design and construction to build a reinforced concrete structure to house the processing equipment, capable of treating up to 29,000 liters of transuranic (TRU) liquid waste each year, which includes a TRU liquid influent storage, and separate utilities. This new facility will be approximately 2,000 sq ft to 4,000 sq ft, hazard category 3 nuclear facility and will replace, at a minimum, the following existing capability:

1) Transuranic (TRU) liquid waste treatment;
2) TRU liquid influent storage.

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. The nine months

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

between completion of the final design and the CD-2/3 approval are allocated to conduct independent reviews and close-out all recommendations. The FY 2015 Peer Review, conducted in July 2015, is in concurrence with updated project cost and schedule projections.

With the exception of procuring long-lead equipment items that will use a limited amount of construction funds, construction will not start and funds will not be released for project use with an approved CD-3.

5. 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	15,952
FY 2017	N/A	0	N/A	4,541
Total, Design	N/A	25,605	N/A	25,605
Construction				
FY 2016	N/A	33,449	N/A	5,000
FY 2017	N/A	17,053	N/A	5,000
FY 2018	N/A	8,995	N/A	35,915
FY 2019	N/A	0	N/A	13,582
Total, Construction	N/A	59,497	N/A	59,497
TEC				
FY 2014	10,605	10,605	10,605	641
FY 2015[a]	7,500	7,500	7,500	4,471
FY 2016	40,949	40,949	40,949	20,952
FY 2017	17,053	17,053	17,053	9,541
FY 2018	8,995	8,995	8,995	35,915
FY 2019	0	0	0	13,582
Total, TEC	85,102	85,102	85,102	85,102
Other Project Cost (OPC)				
OPC except D&D (I&O Ops of Facilities)				
FY 2014	3	3	3	3
Total, OPC except D&D (I&O Ops of Facilities)	3	3	3	3
OPC except D&D (I&O Recapitalization)				
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

[a] FY 2015 Request was $15,000. This was reduced by $7,500 in the Omnibus appropriation.

	(dollars in thousands)			
	Appropriations	Plan	Obligations	Costs
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
Total, OPC except D&D (I&O Recapitalization)	10,425	10,425	10,425	10,425
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
Total, OPC	10,428	10,428	10,428	10,428
Total Project Cost (TPC)				
FY 2014	10,608	10,608	10,608	644
FY 2015	8,154	8,154	8,154	5125
FY 2016	43,010	43,010	43,010	23013
FY 2017	18,553	18,553	18,553	11041
FY 2018	10,495	10,495	10,495	37415
FY 2019	2,000	2,000	2,000	15582
FY 2020	1,710	1,710	1,710	1,710
FY 2021	1,000	1,000	1,000	1000
Total, TPC	95,530	95,530	95,530	95,530

6. Details of Project Cost Estimate

	(dollars in thousands)		
	Current Total Estimate	Previous Total Estimate	Original Validated Baseline
Total Estimated Cost (TEC)			
Design			
Design	17,393	17,393	NA
Design Support (Federal) [a]	300	300	NA
Contingency	7,912	7,912	NA
Total, Design	25,605	25,605	NA
Total Design Contingency	7,912	7,912	NA
Construction			

[a] Needed for federal technical support through Independent Project Reviews required by DOE Order 413.3B and to conduct technical reviews of design and construction documents in support of the Federal Project Director.

(dollars in thousands)

	Current Total Estimate	Previous Total Estimate	Original Validated Baseline
Other Construction	29,237	36,737	NA
Equipment (GFE)	7,500		NA
Safety Basis Documents[a]	6,997	6,997	NA
Construction Support (Federal) [a]	2,000	2,000	NA
Contingency	21,263	21,263	NA
Total, Construction	66,997	66,997	NA
Total, TEC	92,602	92,602	NA
Contingency, TEC	29,175	29,175	NA
Other Project Cost (OPC)			
OPC except D&D			
Conceptual Planning & Conceptual Design[b]	NA	NA	NA
Design Support[a]	2,041	2,041	NA
Start-Up	4,537	4,537	NA
Contingency	3,850	3,850	NA
Total, OPC except D&D	10,428	10,428	NA
D&D			
D&D	0	0	NA
Contingency	0	0	NA
Total, D&D	0	0	NA
Total, OPC	10,428	10,428	NA
Contingency, OPC	3,850	3,850	NA
			NA
Total, TPC	103,030	103,030	NA
Total, Contingency	33,025	33,025	NA

[a] In the FY 2015 Estimate, Safety Basis Documents and Design Support were under one OPC line, Safety Basis and Design Support.

[b] Conceptual design cost is part or the RLWTF Upgrade Project (07-D-220).

7. Schedule of Appropriation Requests

		Prior Years	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	Out-Years	Total
FY 2014	TEC	29,721	56,332	0	0	0	0	0	0	86,053
	OPC	2,293	2,061	1,500	1,500	2,000	3,426	0	0	12,780
	TPC	32,014	58,393	1,500	1,500	2,000	3,426	0	0	98,833
FY 2015	TEC	25,605	60,000	0	0	0		0	0	85,605
	OPC	2,293	2,061	1,500	1,500	2,000	1,074	0	0	10,428
	TPC	27,898	62,061	1,500	1,500	2,000	1,074	0	0	96,033
FY 2016	TEC	18,105	40,949	17,053	8,995	0	0	0	0	85,102
	OPC	657	2,061	1,500	1,500	2,000	2,710	0	0	10,428
	TPC	18,762	43,010	18,553	10,495	2,000	2,710	0	0	95,530
FY 2017	TEC	18,105	40,949	17,053	8,995	0	0	0	0	85,102
	OPC	657	2,061	1,500	1,500	2,000	1,710	1,000	0	10,428
	TPC	18,762	43,010	18,553	10,495	2,000	1,710	1,000	0	95,530

8. Related Operations and Maintenance Funding Requirements

Start of Operation or Beneficial Occupancy (fiscal quarter or date)	2QFY2020
Expected Useful Life (number of years)	50
Expected Future Start of D&D of this capital asset (fiscal quarter)	2QFY2070

(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

9. 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

10. 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

1. Significant Changes and Summary

Significant Changes

This CPDS is an update from Fiscal Year (FY) 2016 and does not include a new start for the budget year. The goals and objectives of the project were updated in section 4 to reflect the deletion of the West End Protected Area Reduction Scope removed in FY 2015.

The Nuclear Facilities, Process Equipment, and Balance of Facilities Subproject/s (04) identified in the FY 2016 CPDS was changed to the Main Process Building (MPB) Subproject and previously included scope was assigned to this and additional subprojects that are new in this CPDS. Overall UPF design remains in subproject 04. Four additional subprojects were added, as described below, but there was no change in the total project scope from the FY 2016 CPDS.

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.

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 HEUMF. The UPF project will be considered complete upon successful completion of the described subset of Building 9212 capabilities.

FY 2017 funds will be used to complete facility designs and for construction of approved subprojects. The data sheet includes preliminary subproject estimate allocations for future subprojects based on conceptual design information. Subproject bottoms-up estimates will be developed to establish each subproject's performance baseline. The project 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 set a performance baseline for the SAB or MPB subproject until the buildings' designs are 90% complete.

Site Readiness Subproject (06-D-141-01): Site Readiness received CD-4 on February 27, 2015. The project was completed under budget and CD-4 was achieved on schedule.

Site Preparation Subproject (06-D-141-02): Site Preparation is no longer its own subproject and costs will be accounted for in the Main Process Building Subproject (06-D-141-04).

West End Protected Area Reduction (WEPAR) Subproject (06-D-141-03): This subproject was cancelled and scope was removed from the project in FY 2015. No funding was spent on this subproject.

Main Process Building Subproject (06-D-141-04): The Main Process Building (MPB) subproject was renamed from the Nuclear Facilities, Process Equipment, and Balance of Facilities Subproject/s identified in the FY 2016 CPDS and the previously included scope was assigned to this and the additional subprojects mentioned below. The MPB subproject CD-2/3 approval is scheduled for the fourth quarter of FY 2017, and the top end of the cost range is estimated at $4.3 billion. The projected CD-4 date is the fourth quarter of FY 2025. A CD-3A for Long Lead Procurement and Site Preparation is scheduled for approval in March 2016. A CD-3B for long lead gloveboxes and a CD-3C for long lead skids is scheduled in first quarter of FY 2017.

Site Infrastructure and Services (SIS) Subproject (06-D-141-05): The SIS 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 approval is scheduled for the second quarter of FY 2017, and the top end of the cost range is estimated at $600 million. The projected CD-4 date is fourth quarter of FY 2021.

Substation Subproject (06-D-141-07): The Substation Subproject CD-2/3 approval is scheduled for the fourth quarter of FY 2016, and the top end of the cost range is estimated at $50 million. The projected CD-4 date is the first quarter of FY 2019. A CD-3A for long lead procurement is scheduled in the third quarter of FY 2016.

Process Support Facilities Subproject (06-D-141-08): The Process Support Facilities Subproject CD-2/3 approval is scheduled for the third quarter of FY 2017, and the top end of the cost range is estimated at $60 million. The projected CD-4 date is the fourth quarter of FY 2021.

Salvage and Accountability Building Subproject (06-D-141-09): The Salvage and Accountability Building Subproject CD-2/3 approval is scheduled for the fourth quarter of FY 2017, and the top end of the cost range is estimated at $1.3 billion. The projected CD-4 date is the fourth quarter of FY 2025.

FY 2017 activities include completing the design for the nuclear buildings and associated support structures, procurements, and construction of subprojects. Project activities include awarding multiple CD-2 and CD-3 packages for smaller, more manageable integrated subprojects to achieve commitments for cost and schedule. Capital project funding will be used for construction of these subprojects but will not be authorized until the respective subproject performance baseline has been validated and the subproject's CD-2 and 3 are approved 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 will be assigned to each subproject. Project funds may be used by the Federal Project Directors for contracted support services for the federal project team.

As represented in the FY 2016 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 and will only be performed using funding specifically appropriated by Congress for the project.

2. Critical Milestone History

	CD-0	Conceptual Design Complete	CD-1	CD-2	Final Design Complete	CD-3	D&D Complete	CD-4
FY 2011	12/17/2004		07/25/2007	TBD	2QFY2014	TBD	TBD	TBD
FY 2012	12/17/2004		07/25/2007	4QFY2013	2QFY2014	4QFY2013	TBD	TBD
FY 2013	12/17/2004		07/25/2007	4QFY2013	2QFY2014	4QFY2013	N/A	4QFY2022
FY 2014	12/17/2004		06/08/2012	3Q FY2014	4QFY2015	3QFY2015	N/A	TBD
FY 2015	12/17/2004		06/08/2012	TBD	TBD	TBD	N/A	TBD
FY 2016	12/17/2004	2/9/2006	06/08/2012	TBD	TBD	TBD	N/A	TBD
FY 2017	12/17/2004	6/24/2015	06/08/2012	4Q FY2017	4Q FY2017	4Q FY2017	N/A	4QFY2025

Site Readiness Subproject (06-D-141-01)

	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		06/08/2012	1/29/2013	01/29/2013	01/29/2013	N/A	2QFY2015
FY 2015	12/17/2004		06/08/2012	1/29/2013	01/29/2013	01/29/2013	N/A	2QFY2015
FY 2016	12/17/2004	2/9/2006	06/08/2012	1/29/2013	01/29/2013	01/29/2013	N/A	2QFY2015
FY 2017	12/17/2004	2/9/2006	06/08/2012	1/29/2013	01/29/2013	01/29/2013	N/A	2/27/2015

Main Process Building Subproject (06-D-141-04)[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 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	06/08/2012	TBD	TBD	TBD	N/A	TBD
FY 2017	12/17/2004	6/24/2015	6/08/2012	4Q FY2017	4Q FY2017	4Q FY2017	N/A	4Q FY2025

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	06/08/2012	2QFY2015	3QFY2015	2QFY2015	N/A	4QFY2016
FY 2017	12/17/2004	2/9/2006	06/08/2012	3/12/2015	3/12/2015	3/12/2015	N/A	4/28/2018

[a] The schedule is estimated and consistent with the high end of the schedule range.

Mechanical Electrical Building (MEB) Subproject (06-D-141-06)[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	06/08/2012	2Q FY2017	4Q FY2017	2Q FY2017	N/A	4Q FY2021

Substation Subproject (06-D-141-07)[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	06/08/2012	4Q FY2016	4Q FY2016	4Q FY2016	N/A	1Q FY2019

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	06/08/2012	3Q FY2017	3Q FY2017	3Q FY2017	N/A	4Q FY2021

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	06/08/2012	4Q FY2017	4Q FY2017	4Q FY2017	N/A	4Q FY2025

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

	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

MPB CD-3A – Long Lead Procurement for equipment.
MPB CD-3B – Long Lead Procurement for gloveboxes.
MPB CD-3C – Long Lead Procurement for equipment skids.
Substation CD-3A – Long Lead Procurement for substation equipment

[a] The schedule is estimated and consistent with the high end of the schedule range.

3. 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

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[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	N/A	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[a]	1,880,000	2,138,723	4,018,723	319,500	0	319,500	4,338,223

[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[a]	58,000	58,000	1,500	N/A	1,500	59,500
FY 2016	N/A[a]	84,500	84,500	500	N/A	500	85,000
FY 2017	N/A	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	N/A	540,000	540,000	60,000	0	600,000	600,000

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	N/A	48,000	48,000	2,000	0	2,000	50,000

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	N/A	55,000	55,000	5,000	0	5,000	60,000

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	N/A	1,200,000	1,200,000	130,000	0	130,000	1,330,000

4. 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 was 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 materials CD-3A: Includes Site Preparation activities and long lead procurements to include bulk material purchases and construction support equipment. Scope also includes temporary facilities, temporary power, storm water, and sanitary sewer installation.

Long Lead Gloveboxes CD-3B: Includes purchase of gloveboxes for the MPB and SAB.

Long Lead Skids CD-3C: Includes purchase of equipment skids for the MPB and SAB

Site Infrastructure and Services Subproject (06-D-141-05): The SIS Subproject is under construction. SIS scope includes demolition of Building 9107; haul road security features; standard civil construction activities such as a sedimentation basin and hillside excavation, installation of a Concrete Batch Plant, and construction of a 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.

> **Long Lead Equipment CD-3A:** Includes TVA procurement of transformers and other long lead procurements required to achieve the CD-4 date.

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.

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 assessments and oversight of the planning and execution of this project.

5. Financial Schedule

Site Readiness Subproject (06-D-141-01)

(dollars in thousands)

	Appropriations	Plan	Obligations	Costs
Total Estimated Cost (TEC)				
Design	N/A	N/A	N/A	N/A
Construction				
FY 2013	N/A	43,277	N/A	5,242
FY 2014	N/A	0	N/A	25,928
FY 2015	N/A	0	N/A	12,107
Total, Construction	N/A	43,277	N/A	43,277
TEC				
FY 2013	N/A	43,277	N/A	5,242
FY 2014	N/A	0	N/A	25,928
FY 2015	N/A	0	N/A	12,107
Total, TEC	N/A	43,277	N/A	43,277
Other Project Cost (OPC)				
OPC				
Total, OPC	N/A	0	N/A	0
Total Project Cost (TPC)				
FY 2013	N/A	43,277	N/A	5,242
FY 2014	N/A	0	N/A	25,928
FY 2015	N/A	0	N/A	12,107
Total, TPC	N/A	43,277	N/A	43,277

Main Process Building Subproject (06-D-141-04)

(dollars in thousands)

	Appropriations	Plan	Obligations	Costs
Total Estimated Cost (TEC)				
Design				
FY 2006	N/A	5,000	N/A	0
FY 2007	N/A	5,000	N/A	677
FY 2008	N/A	38,583	N/A	33,950
FY 2009	N/A	90,622	N/A	79,184
FY 2010	N/A	94,000	N/A	80,959
FY 2011	N/A	114,786	N/A	109,855
FY 2012	N/A	160,194	N/A	170,700
FY 2013	N/A	269,506	N/A	192,389
FY 2014	N/A	304,000	N/A	198,448
FY 2015	N/A	257,000	N/A	200,007
FY 2016	N/A	310,000	N/A	461,665
FY 2017	N/A	231,309	N/A	352,166
Total, Design	N/A	1,880,000	N/A	1,880,000
Construction				
FY 2016	N/A	72,000	N/A	25,000
FY 2017	N/A	143,191	N/A	180,000
FY 2018	N/A	419,667	N/A	415,000
FY 2019	N/A	323,000	N/A	235,000
FY 2020	N/A	285,333	N/A	295,000
FY 2021	N/A	391,000	N/A	395,000
FY 2022	N/A	345,000	N/A	345,000
FY 2023	N/A	112,762	N/A	165,000
FY 2024	N/A	45,000	N/A	68,000
FY 2025	N/A	1,770	N/A	15,723
Total, Construction	N/A	2,138,723	N/A	2,138,723
TEC				
FY 2006	N/A	5,000	N/A	0
FY 2007	N/A	5,000	N/A	677
FY 2008	N/A	38,583	N/A	33,950
FY 2009	N/A	90,622	N/A	79,184
FY 2010	N/A	94,000	N/A	80,959
FY 2011	N/A	114,786	N/A	109,855
FY 2012	N/A	160,194	N/A	170,700
FY 2013	N/A	269,506	N/A	192,389
FY 2014	N/A	304,000	N/A	198,448

(dollars in thousands)

	Appropriations	Plan	Obligations	Costs
FY 2015	N/A	257,000	N/A	200,007
FY 2016	N/A	382,000	N/A	486,665
FY 2017	N/A	374,500	N/A	532,166
FY 2018	N/A	419,667	N/A	415,000
FY 2019	N/A	323,000	N/A	235,000
FY 2020	N/A	285,333	N/A	295,000
FY 2021	N/A	391,000	N/A	395,000
FY 2022	N/A	345,000	N/A	345,000
FY 2023	N/A	112,762	N/A	165,000
FY 2024	N/A	45,000	N/A	68,000
FY 2025	N/A	1,770	N/A	15,723
Total, TEC	N/A	4,018,723	N/A	4,018,723
Other Project Cost (OPC)				
OPC except D&D				
FY 2005	N/A	12,113	N/A	12,113
FY 2006	N/A	7,809	N/A	7,809
FY 2007	N/A	10,082	N/A	10,082
FY 2008	N/A	11,730	N/A	11,730
FY 2009	N/A	14,000	N/A	14,000
FY 2010	N/A	20,500	N/A	20,500
FY 2011	N/A	18,894	N/A	18,894
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	0
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	187,238	N/A	175,000
FY 2024	N/A	24,000	N/A	25,000
FY 2025	N/A	13,134	N/A	24,372
Total, OPC except D&D	N/A	319,500	N/A	319,500

(dollars in thousands)

	Appropriations	Plan	Obligations	Costs
Total Project Cost (TPC)				
FY 2005	N/A	12,113	N/A	12,113
FY 2006	N/A	12,809	N/A	7,809
FY 2007	N/A	15,082	N/A	10,759
FY 2008	N/A	50,313	N/A	45,680
FY 2009	N/A	104,622	N/A	93,184
FY 2010	N/A	114,500	N/A	101,459
FY 2011	N/A	133,680	N/A	128,749
FY 2012	N/A	160,194	N/A	170,700
FY 2013	N/A	269,506	N/A	192,389
FY 2014	N/A	304,000	N/A	198,448
FY 2015	N/A	257,000	N/A	200,007
FY 2016	N/A	382,000	N/A	486,665
FY 2017	N/A	374,500	N/A	532,166
FY 2018	N/A	419,667	N/A	415,000
FY 2019	N/A	323,000	N/A	235,000
FY 2020	N/A	285,333	N/A	295,000
FY 2021	N/A	391,000	N/A	395,000
FY 2022	N/A	345,000	N/A	345,000
FY 2023	N/A	300,000	N/A	340,000
FY 2024	N/A	69,000	N/A	93,000
FY 2025	N/A	14,904	N/A	40,095
Total, TPC	N/A	4,338,223	N/A	4,338,223

Site Infrastructure and Services Subproject (06-D-141-05)

Total Estimated Cost (TEC)				
Design	N/A	N/A	N/A	N/A
Construction				
FY 2015	N/A	78,000	N/A	29,500
FY 2016	N/A	0	N/A	28,700
FY 2017	N/A	0	N/A	19,800
Total, Construction	N/A	78,000	N/A	78,000

	(dollars in thousands)			
	Appropriations	Plan	Obligations	Costs
TEC				
FY 2015	N/A	78,000	N/A	29,500
FY 2016	N/A	0	N/A	28,700
FY 2017	N/A	0	N/A	19,800
Total, TEC	N/A	78,000	N/A	78,000
Other Project Cost (OPC)				
OPC except D&D				
FY 2017	N/A	500	N/A	333
FY 2018	N/A	0	N/A	167
Total, OPC except D&D	N/A	500	N/A	333
Total Project Cost (TPC)				
FY 2015	N/A	78,000	N/A	29,500
FY 2016	N/A	0	N/A	28,700
FY 2017	N/A	500	N/A	20,133
FY 2018	N/A	0	N/A	167
Total, TPC	N/A	78,500	N/A	78,500

Mechanical Electrical Building (MEB) Subproject (06-D-141-06)

Total Estimated Cost (TEC)				
Design	N/A	N/A	N/A	N/A
Construction				
FY 2017	N/A	145,000	N/A	100,000
FY 2018	N/A	150,000	N/A	170,000
FY 2019	N/A	170,000	N/A	190,000
FY 2020	N/A	75,000	N/A	80,000
Total, Construction	N/A	540,000	N/A	540,000
TEC				
FY 2017	N/A	145,000	N/A	100,000
FY 2018	N/A	150,000	N/A	170,000
FY 2019	N/A	170,000	N/A	190,000
FY 2020	N/A	75,000	N/A	80,000
Total, TEC	N/A	540,000	N/A	540,000

	(dollars in thousands)			
	Appropriations	Plan	Obligations	Costs
Other Project Cost (OPC)				
OPC except D&D				
FY 2020	N/A	60,000	N/A	55,000
FY 2021	N/A	0	N/A	5,000
Total, OPC except D&D	N/A	60,000	N/A	60,000
Total Project Cost (TPC)				
FY 2017	N/A	145,000	N/A	100,000
FY 2018	N/A	150,000	N/A	170,000
FY 2019	N/A	170,000	N/A	190,000
FY 2020	N/A	135,000	N/A	135,000
FY 2021	N/A	0	N/A	5,000
Total, TPC	N/A	600,000	N/A	600,000

Substation Subproject (06-D-141-07)

Total Estimated Cost (TEC)				
Design	N/A	N/A	N/A	N/A
Construction				
FY 2016	N/A	48,000	N/A	29,500
FY 2017	N/A	0	N/A	17,500
FY 2018	N/A	0	N/A	1,000
Total, Construction	N/A	48,000	N/A	48,000
TEC				
FY 2016	N/A	48,000	N/A	29,500
FY 2017	N/A	0	N/A	17,500
FY 2018	N/A	0	N/A	1,000
Total, TEC	N/A	48,000	N/A	48,000
Other Project Cost (OPC)				
OPC except D&D				
FY 2019	N/A	2,000	N/A	2,000
Total, OPC except D&D	N/A	2,000	N/A	2,000
Total Project Cost (TPC)				
FY 2016	N/A	48,000	N/A	29,500
FY 2017	N/A	0	N/A	17,500
FY 2018	N/A	0	N/A	0
FY 2019	N/A	2,000	N/A	2,000
Total, TPC	N/A	50,000	N/A	49,000

Process Support Facilities Subproject (06-D-141-08)

(dollars in thousands)

	Appropriations	Plan	Obligations	Costs
Total Estimated Cost (TEC)				
Design	N/A	N/A	N/A	N/A
Construction				
FY 2017	N/A	55,000	N/A	5,000
FY 2018	N/A	0	N/A	25,000
FY 2019	N/A	0	N/A	25,000
Total, Construction	N/A	55,000	N/A	55,000
TEC				
FY 2017	N/A	55,000	N/A	5,000
FY 2018	N/A	0	N/A	25,000
FY 2019	N/A	0	N/A	25,000
Total, TEC	N/A	55,000	N/A	55,000
Other Project Cost (OPC)				
OPC except D&D				
FY 2021	N/A	5,000	N/A	4,000
FY 2022	N/A	0	N/A	1,000
Total, OPC except D&D	N/A	5,000	N/A	5,000
Total Project Cost (TPC)				
FY 2017	N/A	55,000	N/A	5,000
FY 2018	N/A	0	N/A	25,000
FY 2019	N/A	0	N/A	25,000
FY 2020	N/A	0	N/A	0
FY 2021	N/A	5,000	N/A	4,000
FY 2022	N/A	0	N/A	1,000
Total, TPC	N/A	60,000	N/A	60,000

Salvage and Accountability Building Subproject (06-D-141-09)

(dollars in thousands)

	Appropriations	Plan	Obligations	Costs
Total Estimated Cost (TEC)				
Design	N/A	N/A	N/A	N/A
Construction				
FY 2018	N/A	50,333	N/A	50,333
FY 2019	N/A	125,000	N/A	125,000
FY 2020	N/A	199,667	N/A	174,667
FY 2021	N/A	239,000	N/A	264,000
FY 2022	N/A	275,000	N/A	270,000
FY 2023	N/A	175,000	N/A	176,000
FY 2024	N/A	136,000	N/A	140,000
Total, Construction	N/A	1,200,000	N/A	1,200,000
TEC				
FY 2018	N/A	50,333	N/A	50,333
FY 2019	N/A	125,000	N/A	125,000
FY 2020	N/A	199,667	N/A	174,667
FY 2021	N/A	239,000	N/A	264,000
FY 2022	N/A	275,000	N/A	270,000
FY 2023	N/A	175,000	N/A	176,000
FY 2024	N/A	136,000	N/A	140,000
Total, TEC	N/A	1,200,000	N/A	1,200,000
Other Project Cost (OPC)				
OPC except D&D				
FY 2022	N/A	25,000	N/A	5,000
FY 2023	N/A	25,000	N/A	20,000
FY 2024	N/A	45,000	N/A	30,000
FY 2025	N/A	35,000	N/A	75,000
Total, OPC except D&D	N/A	130,000	N/A	130,000
Total Project Cost (TPC)				
FY 2018	N/A	50,333	N/A	50,333
FY 2019	N/A	125,000	N/A	125,000
FY 2020	N/A	199,667	N/A	174,667
FY 2021	N/A	239,000	N/A	264,000
FY 2022	N/A	300,000	N/A	275,000
FY 2023	N/A	200,000	N/A	196,000
FY 2024	N/A	181,000	N/A	170,000
FY 2025	N/A	35,000	N/A	75,000
Total, TPC	N/A	1,330,000	N/A	1,330,000

Overall Project

(dollars in thousands)

	Appropriations	Plan	Obligations	Costs
Total Estimated Cost (TEC)				
Design				
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	200,007
FY 2016	N/A	310,000	285,596	461,665
FY 2017	N/A	231,309	276,841	352,166
Total, Design	0	1,880,000	1,880,000	1,880,000
Construction				
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	41,607
FY 2016	N/A	120,000	120,000	83,200
FY 2017	N/A	343,191	340,000	322,300
FY 2018	N/A	620,000	615,333	661,333
FY 2019	N/A	618,000	615,000	575,000
FY 2020	N/A	560,000	549,667	549,667
FY 2021	N/A	630,000	649,000	659,000
FY 2022	N/A	620,000	610,000	615,000
FY 2023	N/A	287,762	284,900	341,000
FY 2024	N/A	181,000	196,000	208,000
FY 2025	N/A	1,770	1,823	15,723
Total, Construction	N/A	4,103,000	4,103,000	4,103,000
TEC				
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

(dollars in thousands)

	Appropriations	Plan	Obligations	Costs
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	241,614
FY 2016	N/A	430,000	405,596	544,865
FY 2017	N/A	574,500	616,841	674,466
FY 2018	N/A	620,000	615,333	661,333
FY 2019	N/A	618,000	615,000	575,000
FY 2020	N/A	560,000	549,667	549,667
FY 2021	N/A	630,000	649,000	659,000
FY 2022	N/A	620,000	610,000	615,000
FY 2023	N/A	287,762	284,900	341,000
FY 2024	N/A	181,000	196,000	208,000
FY 2025	N/A	1,770	1,823	15,723
Total, TEC	N/A	5,983,000	5,983,000	5,983,000
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	333
FY 2018	N/A	0	0	167
FY 2019	N/A	2,000	2,000	2,000
FY 2020	N/A	60,000	60,000	55,000
FY 2021	N/A	5,000	5,000	9,000
FY 2022	N/A	25,000	25,000	6,000
FY 2023	N/A	212,238	205,888	195,000
FY 2024	N/A	69,000	69,000	55,000
FY 2025	N/A	48,134	54,484	99,372
Total, OPC except D&D	N/A	517,000	517,000	517,000

(dollars in thousands)

	Appropriations	Plan	Obligations	Costs
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	241,614
FY 2016	430,000	430,000	405,596	544,865
FY 2017	575,000	575,000	617,341	674,799
FY 2018	620,000	620,000	615,333	661,500
FY 2019	620,000	620,000	617,000	577,000
FY 2020	620,000	620,000	609,667	604,667
FY 2021	635,000	635,000	654,000	668,000
FY 2022	645,000	645,000	635,000	621,000
FY 2023	500,000	500,000	490,788	536,000
FY 2024	250,000	250,000	265,000	263,000
FY 2025	49,904	49,904	56,307	115,095
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	N/A	N/A
Contingency	0	N/A	N/A
Total, Design	0	N/A	N/A
Construction			
Site Preparation	43,277	50,200	50,200
Equipment	0	0	0
Other Construction	0	0	0
Contingency	0	13,800	13,800
Total, Construction	43,277	64,000	64,000
Total, TEC	43,277	64,000	64,000
Contingency, TEC	0	13,800	13,800
Other Project Cost (OPC)			
OPC except D&D			
Conceptual Planning	0	0	0
Conceptual Design	0	0	0
Start-up	0	1,000	1,000
Contingency	0	0	0
Total, OPC except D&D	0	1,000	1,000
D&D			
D&D	0	0	0
Contingency	0	0	0
Total, D&D	0	0	0
Total, OPC	0	1,000	1,000
Contingency, OPC	0	0	0
Total, TPC	43,277	65,000	65,000
Total, Contingency	0	13,800	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	1,680,000	TBD	N/A
Contingency	200,000	TBD	N/A
Total, Design	1,880,000	TBD	N/A
Construction			
Site Preparation	150,000	TBD	N/A
Long Lead Equipment	50,000	TBD	N/A
Equipment	250,000	TBD	N/A
Other Construction	1,025,723	TBD	N/A
Contingency	663,000	TBD	N/A
Total, Construction	2,138,723	TBD	N/A
Total, TEC	4,018,723	TBD	N/A
Contingency, TEC	863,000	TBD	N/A
Other Project Cost (OPC)			
OPC except D&D			
Conceptual Planning	30,000	TBD	N/A
Conceptual Design	64,500	TBD	N/A
Start-up	200,000	TBD	N/A
Contingency	25,000	TBD	N/A
Total, OPC except D&D	319,500	TBD	N/A
D&D			
D&D	0	N/A	N/A
Contingency	0	N/A	N/A
Total, D&D	0	N/A	N/A
Total, OPC	319,500	TBD	N/A
Contingency, OPC	25,000	TBD	N/A
Total, TPC	4,338,223	TBD	N/A
Total, Contingency	888,000	TBD	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	N/A	N/A
Contingency	0	N/A	N/A
Total, Design	0	N/A	N/A
Construction			
Site Preparation	28,000	25,000	26,000
Equipment	0	30,000	0
Other Construction	25,000	19,500	30,000
Contingency	25,000	10,000	22,500
Total, Construction	78,000	84,500	78,500
Total, TEC	78,000	84,500	78,500
Contingency, TEC	25,000	10,000	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	85,000	78,500
Total, Contingency	25,000	10,000	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	N/A	N/A
Contingency	0	N/A	N/A
Total, Design	0	N/A	N/A
Construction			
Site Preparation	0	N/A	N/A
Equipment	75,000	N/A	N/A
Other Construction	315,000	N/A	N/A
Contingency	150,000	N/A	N/A
Total, Construction	540,000	N/A	N/A
Total, TEC	540,000	N/A	N/A
Contingency, TEC	150,000	N/A	N/A
Other Project Cost (OPC)			
OPC except D&D			
Conceptual Planning	0	N/A	N/A
Conceptual Design	0	N/A	N/A
Start-up	54,000	N/A	N/A
Contingency	6,000	N/A	N/A
Total, OPC except D&D	60,000	N/A	N/A
D&D			
D&D	0	N/A	N/A
Contingency	0	N/A	N/A
Total, D&D	0	N/A	N/A
Total, OPC	60,000	N/A	N/A
Contingency, OPC	6,000	N/A	N/A
Total, TPC	600,000	N/A	N/A
Total, Contingency	156,000	N/A	N/A

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	N/A	N/A
Contingency	0	N/A	N/A
Total, Design	0	N/A	N/A
Construction			
Site Preparation	3,000	N/A	N/A
Long Lead Equipment	15,000	N/A	N/A
Equipment	15,000	N/A	N/A
Other Construction	0	N/A	N/A
Contingency	15,000	N/A	N/A
Total, Construction	48,000	N/A	N/A
Total, TEC	48,000	N/A	N/A
Contingency, TEC	15,000	N/A	N/A
Other Project Cost (OPC)			
OPC except D&D			
Conceptual Planning	0	N/A	N/A
Conceptual Design	0	N/A	N/A
Start-up	2,000	N/A	N/A
Contingency	0	N/A	N/A
Total, OPC except D&D	2,000	N/A	N/A
D&D			
D&D	0	N/A	N/A
Contingency	0	N/A	N/A
Total, D&D	0	N/A	N/A
Total, OPC	2,000	N/A	N/A
Contingency, OPC	0	N/A	N/A
Total, TPC	50,000	N/A	N/A
Total, Contingency	15,000	N/A	N/A

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	N/A	N/A
Contingency	0	N/A	N/A
Total, Design	0	N/A	N/A
Construction			
Site Preparation	0	N/A	N/A
Equipment	5,000	N/A	N/A
Other Construction	40,000	N/A	N/A
Contingency	10,000	N/A	N/A
Total, Construction	55,000	N/A	N/A
Total, TEC	55,000	N/A	N/A
Contingency, TEC	10,000	N/A	N/A
Other Project Cost (OPC)			
OPC except D&D			
Conceptual Planning	0	N/A	N/A
Conceptual Design	0	N/A	N/A
Start-up	4,000	N/A	N/A
Contingency	1,000	N/A	N/A
Total, OPC except D&D	5,000	N/A	N/A
D&D			
D&D	0	N/A	N/A
Contingency	0	N/A	N/A
Total, D&D	0	N/A	N/A
Total, OPC	5,000	N/A	N/A
Contingency, OPC	1,000	N/A	N/A
Total, TPC	60,000	N/A	N/A
Total, Contingency	11,000	N/A	N/A

Salvage and Accountability Building Subproject (06-D-141-09)

(dollars in thousands)

	Current Total Estimate	Previous Total Estimate	Original Validated Baseline
Total Estimated Cost (TEC)			
Design			
Design	0	N/A	N/A
Contingency	0	N/A	N/A
Total, Design	0	N/A	N/A
Construction			
Site Preparation	0	N/A	N/A
Equipment	225,000	N/A	N/A
Other Construction	690,000	N/A	N/A
Contingency	285,000	N/A	N/A
Total, Construction	1,200,000	N/A	N/A
Total, TEC	1,200,000	N/A	N/A
Contingency, TEC	285,000	N/A	N/A
Other Project Cost (OPC)			
OPC except D&D			
Conceptual Planning	0	N/A	N/A
Conceptual Design	0	N/A	N/A
Start-up	110,000	N/A	N/A
Contingency	20,000	N/A	N/A
Total, OPC except D&D	130,000	N/A	N/A
D&D			
D&D	0	N/A	N/A
Contingency	0	N/A	N/A
Total, D&D	0	N/A	N/A
Total, OPC	130,000	N/A	N/A
Contingency, OPC	20,000	N/A	N/A
Total, TPC	1,330,000	N/A	N/A
Total, Contingency	305,000	N/A	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	1,680,000	TBD	N/A
Contingency	200,000	TBD	N/A
Total, Design	1,880,000	TBD	N/A
Construction			
Site Preparation	224,277	TBD	N/A
Equipment	635,000	TBD	N/A
Other Construction	2,095,723	TBD	N/A
Contingency	1,148,000	TBD	N/A
Total, Construction	4,103,000	TBD	N/A
Total, TEC	5,983,000	TBD	N/A
Contingency, TEC	1,348,000	TBD	N/A
Other Project Cost (OPC)			
OPC except D&D			
Conceptual Planning	30,000	TBD	N/A
Conceptual Design	64,500	TBD	N/A
Start-up	370,500	TBD	N/A
Contingency	52,000	TBD	N/A
Total, OPC except D&D	517,000	TBD	N/A
D&D			
D&D	0	N/A	N/A
Contingency	0	N/A	N/A
Total, D&D	0	N/A	N/A
Total, OPC	517,000	TBD	N/A
Contingency, OPC	52,000	TBD	N/A
Total, TPC	6,500,000	TBD	N/A
Total, Contingency	1,400,000	TBD	N/A

7. Schedule of Appropriation Requests

(Dollars in thousands)

		Prior Years	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	Outyears	Total
FY 2011	TEC	1,233,620	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
	OPC	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
	TPC	1,499,649	350,000	TBD	TBD	TBD	TBD	TBD	TBD	TBD
FY 2012	TEC	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
	OPC	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
	TPC	TBD	350,000	TBD	TBD	TBD	TBD	TBD	TBD	TBD
FY 2013	TEC	1,738,185	493,000	258,000	TBD	TBD	TBD	TBD	TBD	TBD
	OPC	105,128	7,000	12,000	TBD	TBD	TBD	TBD	TBD	TBD
	TPC	1,843,313	500,000	270,000	TBD	TBD	TBD	TBD	TBD	6,500,000
FY 2014	TEC	1,648,191	573,604	587,300	616,952	TBD	TBD	TBD	TBD	TBD
	OPC	120,128	13,185	17,000	24,000	TBD	TBD	TBD	TBD	TBD
	TPC	1,768,319	586,789	604,300	640,952	TBD	TBD	TBD	TBD	TBD
FY 2015	TEC	1,439,968	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
	OPC	120,128	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
	TPC	1,560,096	430,000	500,000	515,000	520,000	TBD	TBD	TBD	TBD
FY 2016	TEC	1,439,968	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
	OPC	120,128	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
	TPC	1,560,096	430,000	500,000	515,000	520,000	525,000	TBD	TBD	TBD
FY 2017	TEC	1,459,968	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	OPC	95,128	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	TPC	1,555,096	430,000	575,000	620,000	620,000	620,000	635,000	1,444,904	6,500,000

8. 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

9. 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.

10. 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 will be executed through several acquisition strategies, to include firm fixed price, design bid build, design build and cost plus design build contracts.

The acquisition strategies for the major civil construction scope for the Site Infrastructure and Services Subproject and Site Preparation will be performed as firm fixed price construction contracts or subcontracts. The other subprojects are currently being assessed for best value acquisition strategies to include fixed price, progressive lump sum, and cost plus contracts based on Federal Acquisition Regulation principles.

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.

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

1. Significant Changes and Summary

Significant Changes
This Construction Project Data Sheet (CPDS) is an update to the FY 2016 President's Budget Request CPDS for CMRR and does not include a new start for the budget year.

This FY 2017 project data sheet describes a restructuring of the scope described in FY 2016 as two subprojects [Radioactive Laboratory/Utility/Office Building (RLUOB) Equipment Installation Phase 2 (REI2) and Plutonium Facility 4 (PF-4) Equipment Installation (PEI)] into four subprojects which correlate to the first two steps of the plutonium infrastructure strategy and 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 by the end of calendar year 2019. These subprojects are an alternative approach in lieu of constructing the CMRR Nuclear Facility and provide the same AC and MC capabilities described in the FY 2016 data sheet. The CMRR project scope proposed in FY 2016 as two active sub-projects (REI2 and PEI) is now being executed as four active sub-projects [REI2, PEI Phase 1, PEI Phase 2 and Re-categorizing RLUOB to Hazard Category 3 (RC3)] in FY 2017 to better support the commitment to cease programmatic operations in CMR in 2019 and meet program requirements. This restructuring was approved by the Deputy Secretary of Energy on November 25, 2015.

Summary
The most recent DOE Order 413.3B approved Critical Decision (CD) for the CMRR is a revised CD-1, Approve Alternative Selection and Cost Range, that was approved on August 21, 2014 with a cost range of $2.4 billion - $2.9 billion and CD-4 in FY 2024[a]. Accompanying cost tables display upper estimates of the cost. CD-3A requests for long lead procurement were approved during FYs 2015 and 2016. CD-1 estimates for cost and schedule are provided in this data sheet for the newly proposed subprojects based on the Independent Cost Review (ICR) developed for the approved revised CD-1; these will continue to be refined during the CD process. The CMRR Restructuring does not impact the Revised CD-1 estimate from August 2014.

Under the CMRR restructuring, REI2 scope remains unchanged, other project changes 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. The reconciled cost range at CD-1 for this subproject, after the DOE Office of Acquisition and Project Management (DOE-APM) conducted an ICR, is $505 million - $675 million. 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.

PF-4 Equipment Installation Phase 1 (PEI1) Subproject (04-D-125-05): Maximize 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. This subproject scope will make progress toward ceasing program operations in CMR in 2019. The removal and reconfiguration work will be executed as site prep work

[a] FY 2024 represents the estimated completion as of CD-1 approval. At CD-2, the date will be updated to reflect the approved performance baseline CD-4.

within this subproject. The preliminary cost range for the work in this subproject is $264M - $315M. CD-3A for PEI1 was approved on March 18, 2015. CD-3B for long lead procurements was approved on December 22, 2015.

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 - $685M.

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 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 - $365M.

Prior year project funds and FY 2015 funds will be used to complete conceptual design activities, long lead equipment procurements, site investigation, and other required documentation. NNSA's Office of Defense Programs and NNSA's Office of Acquisition and Project Management will continue to partner with the appropriate organizations within and outside DOE during the process to achieve an approved Performance Baseline. Estimates will be finalized once the project has achieved 90 percent design maturity to support the baseline approval.

Some Other Project Costs (OPCs) are funded from the prior year funding that was approved for reprogramming from this line item to RTBF Operations of Facilities ($17 million). We will utilize these available funds in accordance with direction provided by the appropriate committees. Additional OPCs are addressed in this budget request.

Of the preliminary cost range of $1,500 million - $2,040 million for the sum of the REI2,PEI1, PEI2, and RC3 subprojects, $17 million of the $43.3M reprogrammed in FY 2013 and $35.7 million of the FY 2015 appropriations are included in this range.

A Federal Project Director at the appropriate level will be assigned to each sub-project. Project funds may be used by the Federal Project Directors for contracted support services for the federal project team.

2. Critical Milestone History of 04-D-125-01 through 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 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	08/21/2014	3QFY2016	2QFY2016	3QFY2016	4QFY2019	4QFY2024

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

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

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

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[ab]

	CD-3A	*CD-3B*
FY 2016	12/18/2014	2QFY2015
FY 2017	12/18/2014	12/22/2015

[a] FY 2020 represents the estimated completion as of CD-1 approval. At CD-2, the date will be updated to reflect the approved performance baseline CD-4.

[b] FY 2020 represents the estimated completion as of CD-1 approval. At CD-2, the date will be updated to reflect the approved performance baseline CD-4.

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[b]

	CD-3A	*CD-3B*
FY 2017	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[a]	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[b]

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[d]	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[b]

CD-0 – Approve Mission Need
CD-1 – Approve Alternative Selection and Cost Range
CD-2 – Approve Performance Baseline
CD-3 – Approve Start of Construction/Execution
CD-4 – Approve Start of Operations or Project Completion
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 PEI2/RC3 subprojects were not included in the FY 2016 Construction Project Data Sheet but dates are included here for purposes of comparison.
[b] FY 2020 (PEI1) and FY 2024 (PEI2) represents the estimated completion as of CD-1 approval. At CD-2, the date will be updated to reflect the approved performance baseline CD-4.

3. 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

RLUOB Subproject (04-D-125-01)

(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

RLUOB Equipment Installation (REI) Subproject (04-D-125-02)

(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

Nuclear Facility (NF) Subproject (04-D-125-03)

(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

REI Phase 2 (REI) 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

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

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

04-D-125-07, Re-categorizing RLUOB to HC3 (RC-3)

(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

4. Project Scope and Justification

Scope

The CMRR Project as originally proposed relocated and consolidated mission critical analytical chemistry (AC), material characterization (MC), actinide research and development (R&D) capabilities, provided special nuclear material (SNM) storage and large vessel handling capabilities. 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 by the end of calendar year 2019.

The complete list of CMRR line Item Project Sub-projects since inception is:

- **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 hereby cancelled with the remaining mission need 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, 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 in 2019. Specific capabilities in REI2 scope include, but are not limited to:
  - 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 in 2019. 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:
  - 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:
  - 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 recategorizing 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:
  - 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.

5. Financial Schedule

Prior Subprojects (RLUOB/REI/Nuclear Facility) (04-D-125-01-03)

(dollars in thousands)

	Appropriations	Plan	Obligations	Cost
Design (03-D-103-10)				
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	12,669	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	0	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	0	N/A	73
Total Design (03-D-103-10)	N/A	63,646	N/A	63,646
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	656
FY 2015	N/A	0	N/A	-1,718
FY 2016	N/A	0	N/A	1,786
Total Design (04-D-125)	N/A	387,575	N/A	387,575

(dollars in thousands)

	Appropriations	Plan	Obligations	Cost
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	24,158	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	38,610	N/A	132,932
FY 2013	N/A	0	N/A	15,346
FY 2014	N/A	0	N/A	700
FY 2015	N/A	0	N/A	-1,718
FY 2016	N/A	0	N/A	1,859
Total Design	N/A	451,221	N/A	451,221
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
Total Construction (04-D-125)	N/A	297,361	N/A	297,361
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	66,091	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	53,405	N/A	149,238
FY 2013	N/A	0	N/A	15,341
FY 2014	N/A	0	N/A	632
FY 2015	N/A	0	N/A	-1,718
FY 2016	N/A	0	N/A	1,859
Total TEC	N/A	748,582	N/A	748,582

(dollars in thousands)

	Appropriations	Plan	Obligations	Cost
Other Project Costs Non 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	1,051	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
FY 2016	N/A	0	N/A	17
Total OPC	N/A	88,738	N/A	88,738
Total Project Costs				
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	70,278	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	54,456	N/A	158,380
FY 2013	N/A	0	N/A	19,006
FY 2014	N/A	0	N/A	615
FY 2015	N/A	0	N/A	-1,718
FY 2016	N/A	0	N/A	1,876
Total Project Costs	N/A	837,320	N/A	837,320

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	909
FY 2015	N/A	16,000	N/A	19,288
FY 2016	N/A	0	N/A	27,803
Total Design (04-D-125)	N/A	48,000	N/A	48,000
Construction (04-D-125)				
FY 2012	N/A	15,000	N/A	0
FY 2013	N/A	0	N/A	0
FY 2014	N/A	0	N/A	0
FY 2015	N/A	8,000	N/A	3,298
FY 2016	N/A	108,000	N/A	108,098
FY 2017	N/A	115,000	N/A	134,000
FY 2018	N/A	123,000	N/A	123,000
FY 2019	N/A	104,000	N/A	104,000
FY 2020	N/A	19,000	N/A	19,604
Total Construction (04-D-125)	N/A	492,000	N/A	492,000
Total TEC				
FY 2012	N/A	47,000	N/A	0
FY 2013	N/A	0	N/A	0
FY 2014	N/A	0	N/A	909
FY 2015	N/A	24,000	N/A	22,586
FY 2016	N/A	108,000	N/A	135,901
FY 2017	N/A	115,000	N/A	134,000
FY 2018	N/A	123,000	N/A	123,000
FY 2019	N/A	104,000	N/A	104,000
FY 2020	N/A	19,000	N/A	19,604
Total TEC	N/A	540,000	N/A	540,000
Other Project Costs Non D&D				
FY 2012	N/A	27,000	N/A	0
FY 2013	N/A	0	N/A	0
FY 2014	N/A	0	N/A	4,371
FY 2015	N/A	0	N/A	363
FY 2016	N/A	9,000	N/A	31,266
FY 2017	N/A	10,000	N/A	10,000
FY 2018	N/A	12,000	N/A	12,000
FY 2019	N/A	40,000	N/A	40,000
FY 2020	N/A	37,000	N/A	37,000
Total OPC	N/A	135,000	N/A	135,000

	(dollars in thousands)			
	Appropriations	**Plan**	**Obligations**	**Cost**
Total Project Costs				
FY 2012	N/A	74,000	N/A	0
FY 2013	N/A	0	N/A	0
FY 2014	N/A	0	N/A	5,280
FY 2015	N/A	24,000	N/A	22,949
FY 2016	117,000	117,000	117,000	167,167
FY 2017	N/A	125,000	N/A	144,000
FY 2018	N/A	135,000	N/A	135,000
FY 2019	N/A	144,000	N/A	144,000
FY 2020	N/A	56,000	N/A	56,604
Total Project Costs	N/A	675,000	N/A	675,000

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	10,700	N/A	19,073
FY 2016	N/A	3,500	N/A	3,427
Total Design (04-D-125)	N/A	22,500	N/A	22,500
Construction (04-D-125)				
FY 2012	N/A	13,390	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	29,610	N/A	35,109
FY 2017	N/A	19,000	N/A	19,000
FY 2018	N/A	32,500	N/A	32,500
FY 2019	N/A	49,500	N/A	49,500
FY 2020	N/A	91,310	N/A	91,310
Total Construction (04-D-125)	N/A	235,310	N/A	235,310
Total TEC				
FY 2012	N/A	21,690	N/A	0
FY 2013	N/A	0	N/A	0
FY 2014	N/A	0	N/A	0
FY 2015	N/A	10,700	N/A	26,964
FY 2016	N/A	33,110	N/A	38,536
FY 2017	N/A	19,000	N/A	19,000
FY 2018	N/A	32,500	N/A	32,500
FY 2019	N/A	49,500	N/A	49,500
FY 2020	N/A	91,310	N/A	91,310
Total TEC	N/A	257,810	N/A	257,810

	(dollars in thousands)			
	Appropriations	**Plan**	**Obligations**	**Cost**
Other Project Costs Non D&D				
FY 2012	N/A	7,773	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	3,271
FY 2017	N/A	6,615	N/A	6,615
FY 2018	N/A	5,000	N/A	5,000
FY 2019	N/A	10,000	N/A	10,000
FY 2020	N/A	27,785	N/A	27,785
Total OPC	N/A	57,173	N/A	57,173
Total Project Costs				
FY 2012	N/A	29,463	N/A	0
FY 2013	N/A	0	N/A	0
FY 2014	N/A	0	N/A	4,089
FY 2015	N/A	10,700	N/A	27,377
FY 2016	33,110	33,110	33,110	41,807
FY 2017	N/A	25,615	N/A	25,615
FY 2018	N/A	37,500	N/A	37,500
FY 2019	N/A	59,500	N/A	59,500
FY 2020	N/A	119,095	N/A	119,095
Total Project Costs	N/A	314,983	N/A	314,983

PF-4 Equipment Installation Phase 2 (PEI2) Subproject (04-D-125-06)

	(dollars in thousands)			
	Appropriations	**Plan**	**Obligations**	**Cost**
Design (04-D-125)				
FY 2015	N/A	1,000	N/A	0
FY 2016	N/A	5,500	N/A	7,000
FY 2017	N/A	8,000	N/A	7,500
Total Design (04-D-125)	N/A	14,500	N/A	14,500
Construction (04-D-125)				
FY 2018	N/A	5,000	N/A	5,000
FY 2019	N/A	7,500	N/A	7,500
FY 2020	N/A	9,290	N/A	9,290
FY 2021	N/A	182,000	N/A	177,000
FY 2022	N/A	126,620	N/A	131,620
FY 2023	N/A	118,590	N/A	118,590
FY 2024	N/A	6,000	N/A	6,000
Total Construction (04-D-125)	N/A	455,000	N/A	455,000

(dollars in thousands)

	Appropriations	Plan	Obligations	Cost
Total TEC				
FY 2015	N/A	1,000	N/A	0
FY 2016	N/A	5,500	N/A	7,000
FY 2017	N/A	8,000	N/A	7,500
FY 2018	N/A	5,000	N/A	5,000
FY 2019	N/A	7,500	N/A	7,500
FY 2020	N/A	9,290	N/A	9,290
FY 2021	N/A	182,000	N/A	177,000
FY 2022	N/A	126,620	N/A	131,620
FY 2023	N/A	118,590	N/A	118,590
FY 2024	N/A	6,000	N/A	6,000
Total TEC	N/A	469,500	N/A	469,500
Other Project Costs Non D&D				
FY 2020	N/A	1,000	N/A	1,000
FY 2021	N/A	6,500	N/A	6,500
FY 2022	N/A	25,500	N/A	25,500
FY 2023	N/A	81,905	N/A	81,905
FY 2024	N/A	46,595	N/A	46,595
Total OPC Non D&D	N/A	161,500	N/A	161,500
Other Project Costs D&D				
FY 2020	N/A	30,000	N/A	30,000
FY 2021	N/A	24,000	N/A	24,000
Total OPC D&D	N/A	54,000	N/A	54,000
Total Other Project Costs				
FY 2020	N/A	31,000	N/A	31,000
FY 2021	N/A	30,500	N/A	30,500
FY 2022	N/A	25,500	N/A	25,500
FY 2023	N/A	81,905	N/A	81,905
FY 2024	N/A	46,595	N/A	46,595
Total OPC	N/A	215,500	N/A	215,500
Total Project Costs				
FY 2015	N/A	1,000	N/A	0
FY 2016	5,500	5,500	5,500	7,000
FY 2017	N/A	8,000	N/A	7,500
FY 2018	N/A	5,000	N/A	5,000
FY 2019	N/A	7,500	N/A	7,500
FY 2020	N/A	40,290	N/A	40,290
FY 2021	N/A	212,500	N/A	207,500
FY 2022	N/A	152,120	N/A	157,120
FY 2023	N/A	200,495	N/A	200,495
FY 2024	N/A	52,595	N/A	52,595
Total Project Costs	N/A	685,000	N/A	685,000

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	4,000	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	2,000
FY 2017	N/A	1,000	N/A	3,000
FY 2018	N/A	500	N/A	500
Total Design (04-D-125)	N/A	5,500	N/A	5,500
Construction (04-D-125)				
FY 2018	N/A	2,900	N/A	2,900
FY 2019	N/A	5,095	N/A	5,095
FY 2020	N/A	24,215	N/A	24,215
FY 2021	N/A	78,000	N/A	78,000
FY 2022	N/A	127,690	N/A	127,690
FY 2023	N/A	39,100	N/A	39,100
FY 2024	N/A	8,905	N/A	8,905
Total Construction (04-D-125)	N/A	285,905	N/A	285,905
Total TEC				
FY 2012	N/A	4,000	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	2,000
FY 2017	N/A	1,000	N/A	3,000
FY 2018	N/A	3,400	N/A	3,400
FY 2019	N/A	5,095	N/A	5,095
FY 2020	N/A	24,215	N/A	24,215
FY 2021	N/A	78,000	N/A	78,000
FY 2022	N/A	127,690	N/A	127,690
FY 2023	N/A	39,100	N/A	39,100
FY 2024	N/A	8,905	N/A	8,905
Total TEC	N/A	291,405	N/A	291,405

(dollars in thousands)

	Appropriations	Plan	Obligations	Cost
Other Project Costs Non D&D				
FY 2012	N/A	3,000	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	2,000
FY 2017	N/A	0	N/A	1,000
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	3,500	N/A	3,500
FY 2022	N/A	9,190	N/A	9,190
FY 2023	N/A	44,405	N/A	44,405
FY 2024	N/A	13,500	N/A	13,500
Total OPC	N/A	73,595	N/A	73,595
Total Project Costs				
FY 2012	N/A	7,000	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	4,000
FY 2017	N/A	1,000	N/A	4,000
FY 2018	N/A	3,400	N/A	3,400
FY 2019	N/A	5,095	N/A	5,095
FY 2020	N/A	24,215	N/A	24,215
FY 2021	N/A	81,500	N/A	81,500
FY 2022	N/A	136,880	N/A	136,880
FY 2023	N/A	83,505	N/A	83,505
FY 2024	N/A	22,405	N/A	22,405
Total Project Costs	N/A	365,000	N/A	365,000

Total Project

	(dollars in thousands)			
	Appropriations	**Plan**	**Obligations**	**Cost**
Design (03-D-103-010)				
FY 2004	9,500	9,500	0	0
FY 2005	13,567	13,567	23,067	1,848
FY 2006	27,910	27,910	27,910	19,147
FY 2007	12,669	12,669	14,161	27,213
FY 2008	0	0	0	15,079
FY 2009	0	0	0	-329
FY 2010	0	0	0	44
FY 2011	0	0	0	0
FY 2012	0	0	-1,492	339
FY 2013	0	0	0	188
FY 2014	0	0	0	44
FY 2015	0	0	0	0
FY 2016	0	0	0	73
Total Design (03-D-103-010)	63,646	63,646	63,646	63,646
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	82,910	N/A	132,593
FY 2013	N/A	0	N/A	15,158
FY 2014	N/A	0	N/A	1,565
FY 2015	N/A	27,700	N/A	36,643
FY 2016	N/A	9,000	N/A	42,016
FY 2017	N/A	9,000	N/A	10,500
FY 2018	N/A	500	N/A	500
Total Design (04-D-125)	N/A	478,075	N/A	478,075
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	24,158	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	82,910	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	27,700	N/A	36,643
FY 2016	N/A	9,000	N/A	42,089
FY 2017	N/A	9,000	N/A	10,500
FY 2018	N/A	500	N/A	500
Total Design	N/A	541,721	N/A	541,721

(dollars in thousands)

	Appropriations	Plan	Obligations	Cost
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	43,185	43,185	14,863	16,306
FY 2013	N/A	0	0	-5
FY 2014	N/A	0	28,322	-68
FY 2015	N/A	8,000	N/A	11,189
FY 2016	N/A	137,610	N/A	143,207
FY 2017	N/A	134,000	N/A	153,000
FY 2018	N/A	163,400	N/A	163,400
FY 2019	N/A	166,095	N/A	166,095
FY 2020	N/A	143,815	N/A	144,419
FY 2021	N/A	260,000	N/A	255,000
FY 2022	N/A	254,310	N/A	259,310
FY 2023	N/A	157,690	N/A	157,690
FY 2024	N/A	14,905	N/A	14,905
Total Construction (04-D-125)	N/A	1,765,576	N/A	1,765,576
Total TEC				
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	66,091	66,091	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	126,095	126,095	66,825	149,238
FY 2013	N/A	0	-7,000	15,341
FY 2014	N/A	0	55,927	1,541
FY 2015	N/A	35,700	N/A	47,832
FY 2016	N/A	146,610	N/A	185,296
FY 2017	N/A	143,000	N/A	163,500
FY 2018	N/A	163,900	N/A	163,900
FY 2019	N/A	166,095	N/A	166,095
FY 2020	N/A	143,815	N/A	144,419
FY 2021	N/A	260,000	N/A	255,000
FY 2022	N/A	254,310	N/A	259,310
FY 2023	N/A	157,690	N/A	157,690
FY 2024	N/A	14,905	N/A	14,905
Total TEC	N/A	2,307,297	N/A	2,307,297

	(dollars in thousands)			
	Appropriations	**Plan**	**Obligations**	**Cost**
Other Project Costs Non 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	38,824	38,824	1,051	9,142
FY 2013	N/A	0	0	3,665
FY 2014	N/A	0	37,773	8,443
FY 2015	N/A	0	N/A	776
FY 2016	N/A	9,000	N/A	36,554
FY 2017	N/A	16,615	N/A	17,615
FY 2018	N/A	17,000	N/A	17,000
FY 2019	N/A	50,000	N/A	50,000
FY 2020	N/A	65,785	N/A	65,785
FY 2021	N/A	10,000	N/A	10,000
FY 2022	N/A	34,690	N/A	34,690
FY 2023	N/A	126,310	N/A	126,310
FY 2024	N/A	60,095	N/A	60,095
Total OPC Non D&D	N/A	516,006	N/A	516,006
Other Project Costs D&D				
FY 2020	N/A	30,000	N/A	30,000
FY 2021	N/A	24,000	N/A	24,000
Total OPC D&D	N/A	54,000	N/A	54,000
Total Other Project Costs				
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	38,824	38,824	1,051	9,142
FY 2013	N/A	0	0	3,665
FY 2014	N/A	0	37,773	8,443
FY 2015	N/A	0	N/A	776
FY 2016	N/A	9,000	N/A	36,554
FY 2017	N/A	16,615	N/A	17,615
FY 2018	N/A	17,000	N/A	17,000

	(dollars in thousands)			
	Appropriations	**Plan**	**Obligations**	**Cost**
FY 2019	N/A	50,000	N/A	50,000
FY 2020	N/A	95,785	N/A	95,785
FY 2021	N/A	34,000	N/A	34,000
FY 2022	N/A	34,690	N/A	34,690
FY 2023	N/A	126,310	N/A	126,310
FY 2024	N/A	60,095	N/A	60,095
Total OPC	N/A	570,006	N/A	570,006
Total Project Costs				
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	70,278	70,278	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	164,919	164,919	67,876	158,380
FY 2013	0	0	-7,000	19,006
FY 2014	0	0	93,700	9,984
FY 2015	35,700	35,700	35,700	48,608
FY 2016	155,610	155,610	155,610	221,850
FY 2017	159,615	159,615	159,615	181,115
FY 2018	180,900	180,900	180,900	180,900
FY 2019	216,095	216,095	216,095	216,095
FY 2020	239,600	239,600	239,600	240,204
FY 2021	294,000	294,000	294,000	289,000
FY 2022	289,000	289,000	289,000	294,000
FY 2023	284,000	284,000	284,000	284,000
FY 2024	75,000	75,000	75,000	75,000
Total Project Costs	2,877,303	2,877,303	2,877,303	2,877,303

6. Details of Project Cost Estimate

RLUOB Subproject (04-D-125-01)

(dollars in thousands)

	Current Total Estimate	Previous Total Estimate	Original Validated Baseline
Total Estimate Cost (TEC)			
Design			
Design	0	0	0
Contingency	0	0	0
Total Design	0	0	0
Construction			
Site Work	0	0	0
Long-lead Equipment	0	0	0
Construction	0	0	0
Contingency	0	0	0
Total Construction	194,130	0	0
Total TEC	194,130	0	0
Contingency TEC	0	0	0
Other Project Costs (OPC)	0	0	0
OPC except D&D	0	0	0
Conceptual Planning	0	0	0
Conceptual Design	0	0	0
Contingency	0	0	0
Total OPC except D&D	4,870	0	0
D&D			
D&D	0	0	0
Contingency	0	0	0
Total D&D	0	0	0
Total OPC	4,870	0	0
Contingency OPC	0	0	0
Total TPC	199,000	0	0
Total Contingency	0	0	0

RLUOB Equipment Installation (REI) Subproject (04-D-125-02)

(dollars in thousands)

	Current Total Estimate	Previous Total Estimate	Original Validated Baseline
Total Estimate Cost (TEC)			
Design			
Design	0	0	0
Contingency	0	0	0
Total Design	13,498	0	0
Construction			
Site Work	0	0	0
Long-lead Equipment	0	0	0
Construction	0	0	0
Contingency	0	0	0
Total Construction	138,465	0	0
Total TEC	151,963	0	0
Contingency TEC	0	0	0
Other Project Costs (OPC)	0	0	0
OPC except D&D	0	0	0
Conceptual Planning	0	0	0
Conceptual Design	0	0	0
Contingency	0	0	0
Total OPC except D&D	0	0	0
D&D			
D&D	0	0	0
Contingency	0	0	0
Total D&D	0	0	0
Total OPC	44,797	0	0
Contingency OPC	0	0	0
Total TPC	196,760	0	0
Total Contingency	0	0	0

Nuclear Facility (NF) Subproject (04-D-125-03)

(dollars in thousands)

	Current Total Estimate	Previous Total Estimate	Original Validated Baseline
Total Estimate 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
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	N/A	N/A	N/A
Total TEC	N/A	N/A	N/A
Contingency TEC	N/A	N/A	N/A
Other Project Costs (OPC)	N/A	N/A	N/A
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	N/A	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	N/A	N/A	N/A
Contingency OPC	N/A	N/A	N/A
Total TPC	N/A	N/A	N/A
Total Contingency	N/A	N/A	N/A

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			N/A
Contingency			N/A
Total Design	48,000	96,000	N/A
Construction			
Site Work			N/A
Long-lead Equipment	73,438		N/A
Construction			N/A
Contingency	37,419		N/A
Total Construction	492,000	444,000	N/A
Total TEC	540,000	540,000	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	135,000	135,000	N/A
D&D			
D&D		0	N/A
Contingency		0	N/A
Total D&D		0	N/A
Total OPC	135,000	135,000	N/A
Contingency OPC			N/A
Total TPC	675,000	675,000	N/A
Total Contingency			N/A

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			N/A
Contingency			N/A
Total Design	22,500	125,000	N/A
Construction			
Site Work			N/A
Long-lead Equipment	88,184		N/A
Construction			N/A
Contingency	29,083		N/A
Total Construction	235,310	964,000	N/A
Total TEC	257,810	1,071,000	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	57,190	240,000	N/A
D&D			
D&D			N/A
Contingency			N/A
Total D&D	0	54,000	N/A
Total OPC	57,190	294,000	N/A
Contingency OPC			N/A
Total TPC	315,000	1,365,000	N/A
Total Contingency			N/A

PF-4 Equipment Installation Phase 2 (PEI2) Subproject (04-D-125-06)

(dollars in thousands)

	Current Total Estimate	Previous Total Estimate	Original Validated Baseline
Total Estimate Cost (TEC)			
Design			
Design		N/A	N/A
Contingency		N/A	N/A
Total Design	14,500	N/A	N/A
Construction			
Site Work		N/A	N/A
Long-lead Equipment		N/A	N/A
Construction		N/A	N/A
Contingency		N/A	N/A
Total Construction	455,000	N/A	N/A
Total TEC	469,500	N/A	N/A
Contingency TEC		N/A	N/A
Other Project Costs (OPC)		N/A	N/A
OPC except D&D		N/A	N/A
Conceptual Planning		N/A	N/A
Conceptual Design		N/A	N/A
Contingency		N/A	N/A
Total OPC except D&D	161,500	N/A	N/A
D&D			
D&D		N/A	N/A
Contingency		N/A	N/A
Total D&D	54,000	N/A	N/A
Total OPC	215,500	N/A	N/A
Contingency OPC		N/A	N/A
Total TPC	685,000	N/A	N/A
Total Contingency		N/A	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 Validated Baseline
Total Estimate Cost (TEC)			
Design			
Design		N/A	N/A
Contingency		N/A	N/A
Total Design	5,500	N/A	N/A
Construction			
Site Work		N/A	N/A
Long-lead Equipment		N/A	N/A
Construction		N/A	N/A
Contingency		N/A	N/A
Total Construction	285,905	N/A	N/A
Total TEC	291,405	N/A	N/A
Contingency TEC		N/A	N/A
Other Project Costs (OPC)		N/A	N/A
OPC except D&D		N/A	N/A
Conceptual Planning		N/A	N/A
Conceptual Design		N/A	N/A
Contingency		N/A	N/A
Total OPC except D&D	73,595	N/A	N/A
D&D			
D&D		N/A	N/A
Contingency		N/A	N/A
Total D&D	0	N/A	N/A
Total OPC	73,595	N/A	N/A
Contingency OPC		N/A	N/A
Total TPC	365,000	N/A	N/A
Total Contingency		N/A	N/A

Total Project

(dollars in thousands)

	Current Total Estimate	Previous Total Estimate	Original Validated Baseline
Total Estimate Cost (TEC)			
Design			
Design			N/A
Contingency			N/A
Total Design	541,721	672,221	N/A
Construction			
Site Work			N/A
Long-lead Equipment	33,093		N/A
Construction			N/A
Contingency			N/A
Total Construction	1,765,576	1,687,371	N/A
Total TEC	2,307,297	2,359,582	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	428,319	463,721	N/A
D&D			
D&D			N/A
Contingency			N/A
Total D&D	54,000	54,000	N/A
Total OPC	570,006	517,721	N/A
Contingency OPC			N/A
Total TPC	2,877,303	2,877,303	N/A
Total Contingency			N/A

7. Schedule of Appropriation Requests

(dollars in thousands)

Request		Prior Year	FY2016	FY2017	FY2018	FY2019	FY2020	FY2021	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	983,483	155,610	159,615	180,900	216,095	239,600	0	942,000	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	983,483	155,610	159,615	180,900	216,095	239,600	294,000	648,000	2,877,303

8. Related Operations and Maintenance Funding Requirements

Start of Operation or Beneficial Occupancy (fiscal quarter or date)	4QFY 2020
Expected Useful Life (number of years)	50
Expected Future Start of D&D of this capital asset (fiscal quarter)	4QFY 2070

(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	30,473	750,000	1,523,625
Utilities	3,500	33,583	175,000	1,679,126
Maintenance & Repair	6,500	60,945	325,000	3,397,250
Total	25,000	125,000	1,250,000	6,600,001

Note: The operations, utilities, and maintenance & repair cost are for the RLUOB facility operated as a Hazard Category 3 Nuclear Facility per the current plan (the nuclear facility portion of the project has been cancelled). These cost do not include any of the cost associated with the gloveboxes or equipment installed in PF-4 (an existing facility). The previous estimate was based on the operation of RLUOB and the Nuclear Facilities. The RLUOB was to be operated as Radiological Facility and the Nuclear Facility was to be operated as a Hazard Category 2, Security Category 1 Nuclear Facility.

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 being constructed in these subprojects.

As directed by the DOE Acquisition Executive for CMRR at CD-0, NNSA and LANL developed a pre-conceptual cost and schedule range for the D&D requirements of the existing CMR Building located at TA-3 during the CMRR conceptual design. The initial pre-conceptual cost estimate range for D&D of the CMR Building is approximately $200 million - $350 million (un-escalated FY 2004 dollars) with an associated schedule estimate range of 4-5 years. This information was presented as part of CMRR CD-1 per Secretarial direction issued at CD-0. The deferral of CMRR-NF construction will not impact decisions to cease operations in CMR; NNSA is committed to ceasing programmatic operations in CMR by December 2019.

During the 3rd Quarter of FY 2005, the D&D of the existing CMR facility received CD-0 as a separate project in conjunction with CMRR CD-1 approval. 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.

The CMR D&D commitment is reflected in this PDS for completeness. However, as planning for this D&D activity matures, NNSA may elect to enable this effort as a separate project or execute it as an element of a wider project or program for a portfolio of nuclear security enterprise disposition activities.

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 within the FY 2002 Energy and Water and Water Development Appropriations Bill conference report (107-258). 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 being constructed 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

Site location, building name or numbers, and square footages of existing facilities to be replaced:

Los Alamos National Laboratory; Bldg 03-29; CMR Facility 550,000 sq ft

10. 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 will be executed via LANL-issued final design-bid-build construction contracts. The PEI1 and PEI2 subprojects 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 provides safe and secure transportation of the Nation's nuclear weapons, weapons components, and special nuclear materials to meet projected Department of Energy (DOE), Department of Defense (DOD), and other Government Agency 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 FY 2016 Stockpile Stewardship Management Plan and the Nuclear Posture Review. The Program Direction subprogram provides for the federal agents and the secure transportation workforce.

The STA current capacity will meet the prioritized NNSA Stockpile refurbishment and modernization initiatives and other DOE workload requirements. 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, STA needs to replace aging transportation assets and communication systems to maintain the required convoy safety and security profile.

Highlights of the FY 2017 Budget Request

The pillars of the STA safety and security concept are specialized vehicles (including secure trailers), highly trained agents and communication systems. The $282,732,000 FY 2017 Budget Request is $45,614,000 or 19.2 percent above the FY 2016 Enacted Level to continue asset modernization and workforce capability initiatives. These initiatives include: (1) restoration of federal agent strength levels to 370, (2) the Safeguards Transporter (SGT) Risk Reduction Initiatives to manage the SGT beyond its design life, (3) development and testing of the selected alternative for the SGT replacement referred to as the Mobile Guardian Transporter (MGT), (4) deployment of Mission Management System (MMS) Phase I; and replacement of vehicles and tractors. In addition, STA will ensure its supporting systems remain integrated to support Defense Programs. The STA is a an organization of integrated systems; a funding change in one system can drive fluctuations in requirements in other areas and STA must mitigate the cost, scope, and schedule risks that the interconnected activities can introduce.

Due to prior funding levels and uncertainties, STA cancelled several of the bi-annual Agent Candidate Training (ACT) classes in fiscal years 2011 and 2012. Moreover, the recent rate of attrition lowered agent strength levels. The STA agent force is about 20 percent below full staffing levels. Failure to meet agent level requirements will impact STA's ability to support the nuclear security enterprise initiatives for stockpile refurbishment and modernization.

STA will conduct two agent candidate training classes in an effort to attain the required number of federal agents needed to meet mission capacity. STA must commit itself to a stable human resources strategy to achieve an optimal agent force structure to meet the nuclear security enterprise priorities and mission requirements. It takes many years to achieve any substantial growth to the agent force due to a mandatory 20 year retirement, stringent hiring process, and high standards for the nuclear transportation duty.

As the SGT nears the end of its 20 year design life, the STA began planning for the next-generation secure trailer, the MGT. Results from the rigorous Analysis of Alternatives using independent cost estimates will be used to design the MGT. Since the earliest possible date to field the first production unit is FY 2023, STA will implement a risk reduction effort to keep at least a portion of the SGT fleet in operation beyond the 20-year design life.

The implementation of Phase I of the MMS provides a data warehouse infrastructure with the capability for long-term storage of STA mission data as well as an evolutionary set of tools that will be used to better accomplish the planning, resourcing, execution and analysis of STA missions.

Major Outyear Priorities and Assumptions

Outyear funding levels for STA total $1,357,994,000 for FY 2018 through FY 2021. The STA program identified key strategies to guide the Office of Secure Transportation (OST) over the next 5 to 10 years. These strategies are in line with, and support the Department's Strategic Objective 4 – Maintain the safety, security, and effectiveness of the Nation's nuclear deterrent without nuclear testing. The strategies are:

- Maintain Agent strength
- Strengthen vehicle fleet
- Sustain and support Agent strength
- Modernize and maintain command, control, communications, computer and cyber systems (C5)
- Maintain infrastructure

Secure Transportation Asset
Funding

(Dollars in Thousands)

	FY 2015 Enacted	FY 2015 Current	FY 2016 Enacted	FY 2017 Request	FY 2017 vs FY 2016
Secure Transportation Asset (STA)					
Operations and Equipment					
Mission Capacity	73,549	74,473	67,220	63,805	-3,415
Security/Safety Capability	17,586	17,586	21,073	24,364	+3,291
Infrastructure and C5 Systems	21,115	21,115	24,267	30,333	+6,066
Program Management	9,632	9,632	10,090	10,470	+380
Mobile Guardian Transporter	0	0	17,350	50,160	+32,810
Total, Operations and Equipment	**121,882**	**122,806**	**140,000**	**179,132**	**+39,132**
Program Direction - Albuquerque					
Salaries and Benefits	77,902	77,902	80,193	83,312	+3,119
Travel	5,792	5,792	4,657	4,886	+229
Other Related Expenses	13,424	13,424	12,268	15,402	+3,134
Total, Program Direction - Albuquerque	**97,118**	**97,118**	**97,118**	**103,600**	**+6,482**
Total, Secure Transportation Asset	**219,000**	**219,924**	**237,118**	**282,732**	**+45,614**
Direction Funded	547	547	561	572	+11
Federal FTEs - WCF Funded	0	0	0	0	0
Total FTEs	**547**	**547**	**561**	**572**	**+11**

Outyears for Secure Transportation Asset Funding

(Dollars in Thousands)

	FY 2018 Request	FY 2019 Request	FY 2020 Request	FY 2021 Request
Secure Transportation Asset (STA)				
Operations and Equipment				
Mission Capacity	62,105	69,575	64,124	62,532
Security/Safety Capability	23,345	23,767	24,552	24,985
Infrastructure and C5 Systems	38,321	36,957	26,225	48,425
Program Management	10,643	10,820	11,001	11,175
Mobile Guardian Transporter	88,550	103,290	100,980	68,090
Total, Operations and Equipment	**222,964**	**244,409**	**226,882**	**215,207**
Program Direction - Albuquerque				
Salaries and Benefits	86,515	89,786	92,930	95,053
Travel	4,986	5,088	5,186	5,289
Other Related Expenses	15,599	15,826	15,984	16,290
Total, Program Direction - Albuquerque	**107,100**	**110,700**	**114,100**	**116,632**
Total, Secure Transportation Asset	**330,064**	**355,109**	**340,982**	**331,839**
Direction Funded	585	597	604	604
Federal FTEs - WCF Funded	0	0	0	0
Total FTEs	**585**	**597**	**604**	**604**

Secure Transportation Asset
Explanation of Major Changes
(Dollars in Thousands)

	FY 2017 vs FY 2016
Secure Transportation Asset	
Operations and Equipment: The funding increase supports the MGT program schedule including design and systems development and initiation of the procurement process for the full scale prototype; production of vehicles to meet the required convoy security configuration to include 8 Support Vehicles; Production of 7 Replacement Armored Tractors and refurbishment of 10 Escort Vehicle—Light Chassis; development and design of unmanned aerial system (UAS) platforms; contractual services in support of ACT training; sustainment of the Advanced Radio Enterprise System (ARES); recapitalization of facilities and the integration of business functions and processes that control, assist, and direct secure transportation operations.	+39,132
Program Direction: The funding provides for two 24 man ACT courses and backfill of staff vacancies. The manpower provides the direct Federal support for the transport of nuclear weapons, components, and special nuclear materials to support the nuclear security enterprise. The increase is attributable to costs for processing clearances, administration of the Human Reliability Program (HRP) requirements, STA's portion of tenant fees, Energy IT Services - Desktop Services, and 2% inflation. FY 2016 funding was supplemented during the continuing resolution (CR) with planned unobligated FY 2015 funds.	+6,482
Total, Secure Transportation Asset	**+45,614**

Secure Transportation Asset
Operations and Equipment

Description
The four activities within the STA Operations and Equipment subprogram make unique contributions to the safety and security of the nuclear stockpile.

The Mission Capacity activity sustains STA systems capacity through equipment purchases and maintenance of the agent manpower to fulfill present transportation requirements. This funding area includes the following activities: (1) Conducts Agent Candidate Training (ACT) classes to maintain agent end-strength. Funding supports the recruiting, equipping, and training of federal agent candidates necessary to maintain the workforce impacted by attrition. (2) Replaces the aging vehicle fleet with newly designed vehicles. Funding supports the design, engineering, testing, and fielding of specialized vehicles, tractors, and trailers necessary for successful convoy operations. (3) Maintains the aviation program. Funding supports the maintenance and sustainment of the aircraft fleet. (4) Maintains readiness posture of the STA fleet.
STA must maintain assets to support current and future missions based on changing customer needs, budgets, and threats. These assets include vehicles (tractors, trailers, and escort vehicles), facilities, and aircraft. Modernizing and sustaining these assets requires an integrated, long-term strategy and plan, and a substantial investment. The STA strategy includes eliminating outdated assets, refurbishing existing assets to extend their useful life, and procuring new assets.

FY 2018-FY 2021 Key Milestones
- FY2018 - Complete production of Replacement Armored Tractor
- FY2018 - Complete 737 aircraft modifications

The Security/Safety Capability activity supports the following sub-elements: (1) Identifies, designs, and tests new fleet and unmanned aerial systems technologies to enhance mission operations. Funding supports safety and security upgrades and enhancements to the secure trailers, analysis of intelligence data, dissemination of information, and the application of emerging physical security technology. (2) Sustains and supports intensified training. Funding supports the technical equipment, logistics, curriculum development, and staffing for Special Response Force (SRF) training, Operational Readiness Training (ORT), Validation Force-on-Force (VFOF) exercises, and agent sustainment training. Sustainment training includes, but is not limited to, surveillance detection, tactics, advanced driving, firearms, and mission operations. Funds are used to obtain off-site training venues capable of supporting units or commands which are necessary to maintain specialized federal agent skills and qualifications, including off-road driving and weapon training. (3) Maintains security and safety programs. Funding supports liaison with state and local law enforcement organizations; analysis of security methods and equipment; vulnerability assessments; development of the Safeguards and Security Plan using 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. (4) Maintains the STA emergency response capability. Funding supports the Emergency Management Program to include Federal Agent Incident Command System refresher and sustainment training.

FY 2018-FY 2021 Key Milestones
- Conduct annual Operational Readiness Training
- Conduct annual Validation Force-on-Force
- Conduct performance-based assessments to evaluate critical system elements
- Validate security methods and systems

The Infrastructure and classified command and control, communication, computer, and cyber (C5) systems activity sustains the infrastructure and command and control system platforms that the STA operates. This funding supports the following sub-elements: (1) Modernize and maintain C5 systems activities to maintain vigilant oversight of nuclear convoys. Funding supports operation of the Transportation Emergency Control Centers, communications maintenance, and the costs for operating relay stations in four states. (2) Expand, upgrade, and maintain the STA facilities and equipment in support of federal agents and projected workload. Funding supports the utilities, maintenance, upgrades, and required expansion projects for approximately 68 facilities and their respective equipment. Facilities include federal agent commands, vehicle electronic and mechanical maintenance facilities, relay stations, training facilities, and facilities for house support staff.

FY 2018-FY 2021 Key Milestones

- Maintain infrastructure and C5 systems to support mission operations and agent training requirements
- Sustain the STA facilities to support mission operations
- Reduce deferred maintenance requirements at Federal Agent Commands
- Renovate facilities at TRACOM to support Federal Agent training and qualification requirements

The Program Management activity includes the following: (1) Provide for corporate functions including technical document support and business operations that control, assist, and direct secure transport operations. This includes supplies, equipment and technical document production, and regulation control processes. (2) Assess, evaluate, and improve work functions and processes. Funding supports quality studies, self-inspections, routine STA intranet web support, configuration management, and business integration activities.

FY 2018-FY 2021 Key Milestones

- Update vehicle maintenance training manuals associated with vehicle modification upgrades and communication capabilities

The Safeguards Transporter replacement, referred to as the Mobile Guardian Transporter will: 1) Address new security threats and provide the means for classified communications; 2) Assure the safety and security of existing and planned future cargo and containers; and 3) Protect the public and meet nuclear explosive safety requirements associated with accident scenarios.

FY 2018-FY 2021 Key Milestones

- FY2018 - Complete MGT baseline design review

Activities and Explanation of Changes

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs FY 2016
Operations and Equipment $140,000,000	**Operations and Equipment $179,132,000**	**Operations and Equipment +$39,132,000**
Mission Capacity $67,220,000	**Mission Capacity $63,805,000**	**Mission Capacity -$3,415,000**
• Produce 15 Escort Vehicle-light Chassis • Produce 9 Support Vehicles • Re-compete the aviation maintenance contract • Produce 7 Replacement Armored Tractors • Obtain International Standards for Business Aircraft Stage II Certification	• Refurbish 10 Escort Vehicle-light Chassis • Produce 8 Support Vehicles • Produce 7 Replacement Armored Tractors	• The decrease reflects the reduction in the number of Escort Vehicle-light Chassis which supports the steady-state production schedule.
Security/Safety Capability $21,073,000	**Security/Safety Capability $24,364,000**	**Security/Safety Capability +$3,291,000**
• Implement a uniform and accredited National Incident Management System/Incident Command System training program for agents and staff • Achieve full implementation of incumbent agent physical readiness training • Conduct an OST operational emergency response exercise	• Provide tactical medical training to agents • Develop and design unmanned aerial system platforms	• The increase provides for training events and venues required to maintain operational readiness for federal agents and emergency response personnel. • Enhanced safety and security for over-the-road mission operations.
Infrastructure and C5 Systems $24,267,000	**Infrastructure and C5 Systems $30,333,000**	**Infrastructure and C5 Systems +$6,066,000**
• Complete fielding and training of ARES and exploit tactical enhancements • Complete the Iridium global positioning system (GPS) V2 installation • Integrate the Mission Management System (MMS) and personnel management tools to provide near real-time personnel management at the unit level and build data files for metrics	• Begin enhancing the training fleet with ARES • Decommission Savannah River Relay Station • Provide for minor construction projects at the federal agent commands	• Sustains vehicle communication systems initiatives. • Facility infrastructure requirements to include deferred maintenance.

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs FY 2016
Program Management $10,090,000	**Program Management $10,470,000**	**Program Management +$380,000**
• Execute OST-designated projects in accordance with an approved project management plan using prescribed estimating methods	• Continues execution of OST-designated projects in accordance with an approved project management plan using prescribed estimating methods • Provide for efficient support services to meet mission requirements	• Increase reflects inflation applied to support services and M&O support.
Mobile Guardian Transporter $17,350,000	**Mobile Guardian Transporter $50,160,000**	**Mobile Guardian Transporter +$32,810,000**
• Systems prototyping • Baseline design • Begin identification process for production agency • Incorporate Nuclear Explosive Safety Studies into design	• Conduct MGT design • Begin the procurement process for the full scale prototype test unit	• The increase supports the MGT Conceptual Design Review and systems prototyping.

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 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021
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	100% of shipments	100% of shipments	100% of shipments	100% of shipments
Result	100						
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 2015 Enacted	FY 2015 Current	FY 2016 Enacted	FY 2017 Request	FY 2017 vs FY 2016 Request
Capital Operating Expenses Summary (including (Major Items of Equipment (MIE)							
Capital Equipment >$500K (including MIE)	N/A	N/A	18,810	18,810	19,224	19,647	+423
Plant Projects (GPP) (<$10M)	N/A	N/A	225	225	230	235	+5
Total, Capital Operating Expenses	**N/A**	**N/A**	**19,035**	**19,035**	**19,454**	**19,882**	**+428**
Capital Equipment > $500K (including MIE)							
Total Non-MIE Capital Equipment (>$500K)	N/A	N/A	18,810	18,810	19,224	19,647	+423
Total, Capital Equipment (including MIE)	N/A	N/A	**18,810**	**18,810**	**19,224**	**19,647**	**+423**
Plant Projects (GPP and IGPP) (Total Estimated Cost (TEC) <$10M)							
Total Plant Projects (GPP) (Total Estimated Cost (TEC) <$5M)	N/A	N/A	225	225	230	235	+5
Total, Plant Projects (GPP) (Total Estimated Cost (TEC) <$10M)	N/A	N/A	**225**	**225**	**230**	**235**	**+5**
Total, Capital Summary	**N/A**	**N/A**	**19,035**	**19,035**	**19,454**	**19,882**	**+428**

Outyears for Secure Transportation Asset

(Dollars in Thousands)

	FY 2018 Request	FY 2019 Request	FY 2020 Request	FY 2021 Request
Capital Operating Expenses Summary (including (Major Items of Equipment (MIE)				
Capital Equipment >$500K (including MIE)	20,079	20,521	20,972	21,433
Plant Projects (GPP) (<$10M)	240	245	250	256
Total, Capital Operating Expenses	**20,319**	**20,766**	**21,222**	**21,689**
Capital Equipment > $500K (including MIE)				
Total Non-MIE Capital Equipment (>$500K)	20,079	20,521	20,972	21,433
Total, Capital Equipment (including MIE)	**20,079**	**20,521**	**20,972**	**21,433**
Plant Projects (GPP) (Total Estimated Cost (TEC) <$10M)				
Total Plant Projects (GPP) (Total Estimated Cost (TEC) <$5M)	240	245	250	256
Total, Plant Projects (GPP) (Total Estimated Cost (TEC) <$10M)	**240**	**245**	**250**	256
Total, Capital Summary	**20,319**	**20,766**	**21,222**	**21,689**

Secure Transportation Asset
Program Direction

Description

The STA Program Direction provides personnel to enhance the safety and security of the nuclear stockpile by: (1) conducting armed escorts of nuclear weapons, materials, and components; (2) conducting air movements of limited life components and federal agents; (3) tracking nuclear convoys and providing emergency response capability; (4) performing staff oversight of three federal agent commands; (5) providing oversight to the design and implementation of classified security technologies; (6) providing critical skills training to the federal agent force and staff; (7) staffing and operating the Training Command and conducting two 21-week training classes per year for new agents; and, (8) performing administrative and logistical functions for the organization.

Salaries and benefits are provided for the program staff at Albuquerque, New Mexico and Fort Chaffee, Arkansas and for federal agents and support staff at the three federal agent force locations (Albuquerque, New Mexico; Oak Ridge, Tennessee; and Amarillo, Texas). It also includes overtime, workmen's compensation, and health and retirement benefits associated with federal agents, secondary positions, and support staff. The total Full Time Equivalent (FTEs) also support the federal agent force, federal pilots, emergency management, security and safety programs, and other key elements of the STA mission. The onboard count may not match the FTEs. Funding allocations account for projected/average vacancy rates.

Other Related Expenses provides: 1) required certification training for performing nuclear explosive duties by federal agents, as well as staff professional development; 2) a human reliability program for federal agents and designated staff; 3) Permanent Change of Station (PCS) moves; and, 4) other contractual service requirements to include facility maintenance; Albuquerque Complex fee for a portion of the security, utilities and other services rendered; and, payment for the Energy IT Services - Desktop Services.

FY 2018-FY 2021 Key Milestones

- Support multiple LEP transport priorities and other prioritized missions
- Restore Federal Agent strength levels to support mission requirements
- Support travel to meet prioritized missions
- Continue to identify methods that streamline the management and adjudication of human reliability issues, while maintaining the high standards for nuclear material courier duties

Program Direction

Activities and Explanation of Changes

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs FY 2016
Program Direction $97,118,000	**Program Direction $103,600,000**	**Program Direction +$6,482,000**
Salaries and Benefits $80,193,000	**Salaries and Benefits $83,312,000**	**Salaries and Benefits +$3,119,000**
• 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 manage overtime expenditures • Continue to conduct agent candidate classes • Continue to support key safety-related initiatives to reduce worker's compensation expenditures	• 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 manage overtime expenditures • Continue to conduct agent candidate classes • Continue to support key safety-related initiatives to reduce worker's compensation expenditures	• Provide for additional agents required to maintain capacity in addition to the inflation applied to salaries and benefits.
Travel $4,657,000	**Travel $4,886,000**	**Travel +$229,000**
• 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	• 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.	• Projected mission requirements.
Other Related Expenses $12,268,000	**Other Related Expenses $15,402,000**	**Other Related Expenses +$3,134,000**
• Apply HRP to ACT candidates • Provide for processing of clearances • Provide facility maintenance • Support for Energy IT Services - Desktop Services and tenant fees • Provide fellowship training opportunities for personnel	• Apply HRP to ACT candidates • Provide for processing of clearances • Provide facility maintenance • Support for Energy IT Services - Desktop Services and tenant fees • Provide fellowship training opportunities for personnel	• Administration of the HRP requirements. • Increasing Energy IT Services - Desktop Services and Tenant Fees.

Nuclear Counterterrorism Incident Response
Funding

(Dollars in Thousands)

	FY 2015 Enacted	FY 2015 Current	FY 2016 Enacted	FY 2017 Request	FY 2017 vs FY 2016
Nuclear Counterterrorism Incident Response [a]					
Emergency Response	142,577	142,577	0	0	0
Emergency Management	5,668	5,668	0	0	0
National Technical Nuclear Forensics	10,250	10,250	0	0	0
Operations Support	14,850	14,850	0	0	0
International Emergency Management and Cooperation	4,595	4,845	0	0	0
Total, Nuclear Counterterrorism Incident Response [a]	**177,940**	**178,190**	**0**	**0**	**0**

[a] The Nuclear Counterterrorism Incident Response Program was transferred from the Weapons Activities appropriation to the Defense Nuclear Nonproliferation appropriation in FY 2016.

Counterterrorism and Counterproliferation Programs
Funding

(Dollars in Thousands)

	FY 2015 Enacted	FY 2015 Current	FY 2016 Enacted	FY 2017 Request	FY 2017 vs FY 2016
Counterterrorism and Counterproliferation Programs [a]					
Counterterrorism and Counterproliferation	46,093	46,093	0	0	0
Total, Counterterrorism and Counterproliferation Programs [a]	**46,093**	**46,093**	**0**	**0**	**0**

[a] The Counterterrorism and Counterproliferation Program has been merged with the Nuclear Counterterrorism Incident Response, and moved from the Weapons Activities appropriation to the Defense Nuclear Nonproliferation appropriation starting in FY 2016.

Site Stewardship
Funding

(Dollars in Thousands)

	FY 2015 Enacted	FY 2015 Current	FY 2016 Enacted	FY 2017 Request	FY 2017 vs FY 2016
Site Stewardship					
Environmental Projects and Operations	48,700	48,700	0	0	0
Nuclear Materials Integration	13,300	13,300	0	0	0
Minority Serving Institution Partnership Program	14,531	14,531	0	0	0
Total, Site Stewardship	**76,531**	**76,531**	**0**	**0**	**0**

[a] Starting in FY 2016, the Environmental Projects and Operations project has been moved to the Safety and Environmental Operations Program within Infrastructure and Operations, Nuclear Materials Integration has moved to the Strategic Materials Sustainment Program within Directed Stockpile Work, and the Minority Serving Institution Partnership Program has been moved to Academic Alliances as Partnerships within the Science Program.

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 national security site, which support NNSA missions.

In addition DNS provides unique knowledge and expertise in nuclear security for a broader 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 provides protection from a full spectrum of threats for NNSA personnel, facilities, nuclear material, and classified matter.

Highlights of the FY 2017 Budget Request

DNS executes the security program to meet mission needs, minimize risk, and ensure the highest priorities are met. DNS employs over 1,500 protective force officers, securing more than 4,700 buildings, and protecting over 48,900 personnel.

DNS provides protection for NNSA personnel, facilities, and nuclear weapons and materials from a full spectrum of threats, ranging from local security incidents to terrorism. Provides for safeguards and security requirements including protective forces and systems at NNSA sites. In FY 2017, the Budget Request includes funding to fill vacant positions in key security program areas at the sites, such as classification protection, technical surveillance countermeasures, and nuclear materials measurements, accounting, and physical inventory. It also supports increased maintenance for existing site security systems, and includes preliminary planning and design funds for future line item construction projects for Perimeter Intrusion Detection and Assessment Systems (PIDAS) at the Pantex and Y-12 sites. The full scope of the PIDAS projects are still under review and future budget requests will reflect funding requirements. Additional identification of scope, prioritization of need, and refinement of acquisition strategy representing a complete funding profile will be addressed in the 10-year Refresh Plan.

The Security Improvements Program (SIP) was created with $30,000,000 in one-time FY 2016 funds to begin to address 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 2017 no funds are requested. DNS will provide a further funding plan for SIP by project as directed in the Consolidated Appropriations Act, 2016.

This request funds the second phase of the Device Assembly Facility (DAF) Argus Line Item Project at the Nevada National Security Site (NNSS). Argus is the NNSA enterprise security system to integrate access control, intrusion detection, and video assessment of alarms for protection of high consequence assets.

Major Outyear Priorities and Assumptions

Outyear funding levels for DNS total $2,799,944,000 for FY 2018 through FY 2021. In the outyears, except for the replacement and upgrade of the physical security infrastructure, this funding level supports maintaining a risk-based security program and collaboration with the Department of Defense, in support of nuclear security enterprise goals.

Defense Nuclear Security
Funding

(Dollars in Thousands)

	FY 2015 Enacted	FY 2015 Current	FY 2016 Enacted	FY 2017 Request	FY 2017 vs FY 2016
Defense Nuclear Security					
Operations and Maintenance					
Protective Forces	378,485	378,485	390,592	387,000	-3,592
Physical Security Systems	89,866	89,866	85,805	95,564	+9,759
Information Security	30,432	30,432	29,779	31,776	+1,997
Personnel Security	34,151	34,151	33,587	33,021	-566
Materials Control and Accountability	28,678	28,678	24,839	26,568	+1,729
Security Program Operations and Planning	74,511	74,511	75,289	83,204	+7,915
Total, Operations and Maintenance	**636,123**	**636,123**	**639,891**	**657,133**	**+17,242**
Security Improvements Program (SIP)	0	0	30,000	0	-30,000
Construction	0	0	13,000	13,000	0
Total, Defense Nuclear Security	**636,123**	**636,123**	**682,891**	**670,133**	**-12,758**

Outyears for Defense Nuclear Security
Funding

(Dollars in Thousands)

	FY 2018 Request	FY 2019 Request	FY 2020 Request	FY 2021 Request
Defense Nuclear Security				
Operations and Maintenance				
Protective Forces	401,042	407,582	415,157	425,167
Physical Security Systems	99,032	100,646	102,517	104,989
Information Security	32,929	33,466	34,088	34,910
Personnel Security	34,219	34,777	35,423	36,278
Materials Control and Accountability	27,532	27,981	28,501	29,188
Security Program Operations and Planning	86,223	87,629	89,258	91,410
Total, Operations and Maintenance	**680,977**	**692,081**	**704,944**	**721,942**
Security Improvements Program (SIP)	0	0	0	0
Construction	0	0	0	0
Total, Defense Nuclear Security	**680,977**	**692,081**	**704,944**	**721,942**

Defense Nuclear Security
Explanation of Major Changes
(Dollars in Thousands)

	FY 2017 vs FY 2016
Defense Nuclear Security	
Operations and Maintenance: The funding provides for backfills of vacant positions in key security program areas at the sites, such as classification protection, technical surveillance countermeasures, and nuclear materials measurements, accounting, and physical inventory. It funds increased maintenance for existing site security systems. It also includes preliminary planning and design funds for planned future line item projects for Perimeter Intrusion Detection and Assessment Systems (PIDAS) at the Pantex and Y-12 sites.	+17,242
Security Improvements Program (SIP): 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 2017.	-30,000
Construction: No change. Completes the second phase for the replacement of the Process Equipment and Control System (PECOS) system, including associated infrastructure, at the NNSS DAF with Argus.	0
Total, Defense Nuclear Security	**-12,758**

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 Safeguards and Security Plan or a Site Security Plan detailing protection measures and resources needed to protect site security interests.

Protective Forces carries out duties, specialized training, performance testing, facilities, equipment, weapons/firearms, ammunition, vehicles, and expenses. These forces are the 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 implements program activities including 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 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, such as PIDAS, help DNS protect and secure more than 4,700 buildings and over 48,900 personnel with over 1,500 protective force officers.

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 executes program activities including 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 Department of Energy (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 directs, oversees, and administers planning, training, and development for security programs. This 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, control of security technology transfer activities, processing facility clearances, and Foreign Ownership, Control or Influence (FOCI) determinations for security contracts.

FY 2018-FY 2021 Key Milestones

- Implementation of the congressional-mandated Center for Security Technology, Analysis and Response Testing.
- Identify equipment and systems that are strong candidates for standardization and central procurements.
- Revitalize the Field Performance Assurance Program.

Activities and Explanation of Changes

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs FY 2016
Operations and Maintenance $639,891,000	**Operations and Maintenance $657,133,000**	**Operations and Maintenance $17,242,000**
Protective Forces $390,592,000	**Protective Forces $387,000,000**	**Protective Forces -$3,592,000**
• Realigns site staffing and relief regimens to cover critical posts while minimizing unscheduled overtime. • 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.	• Reflects efficiencies where practicable, such as minimizing unscheduled overtime and coordination of required training hours to ensure post coverage.
Physical Security Systems $85,805,000	**Physical Security Systems $95,564,000**	**Physical Security Systems +$9,759,000**
• Maintains physical security systems infrastructure, barring unforeseen systems failures. Several systems are at or beyond expected service life. Protects against the threat as documented in the 2008 Graded Security Protection policy.	• Funds increase maintenance for physical security systems and infrastructure at multiple sites, and provides protection against the threat as documented in the 2008 Graded Security Protection policy.	• Funds increase maintenance and testing of existing systems at several sites, including Y-12, Pantex, LANL and NNSS.
Information Security $29,779,000	**Information Security $31,776,000**	**Information Security +$1,997,000**
• Maintains an information protection program while implementing efficiencies in a risk-based manner.	• Maintains an information protection program and permits filling vacancies at several sites.	• Permits sites to backfill several positions in classification protection and Technical Surveillance Countermeasures that have been vacant.
Personnel Security $33,587,000	**Personnel Security $33,021,000**	**Personnel Security -$566,000**
• 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.	• Reflects efficiencies.

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs FY 2016
Materials Control and Accountability $24,839,000	**Materials Control and Accountability $26,568,000**	**Materials Control and Accountability +$1,729,000**
• Provides for control and accountability of special and alternative nuclear materials and maintains a level of effort to sustain a critical part of NNSA's layered protection program. • Continues implementation of the LANMAS software upgrade.	• Provides for control and accountability of special and alternative nuclear materials and maintains a level of effort that to a critical part of NNSA's layered protection program. • Continues implementation of the LANMAS software upgrade. • Permits backfill of key positions at several sites.	• Permits sites to backfill several positions in nuclear material measurements, accounting, and physical inventory.
Security Program Operations and Planning $75,289,000	**Security Program Operations and Planning $83,204,000**	**Security Program Operations and Planning +$7,915,000**
• Maintains a Program Operations and Planning capability that includes preparation of site security plans, management of site programs for incidents of security concern, and security awareness programs.	• Maintains a Program Operations and Planning capability that includes preparation of site security plans, management of site programs for incidents of security concern, and security awareness programs. • Includes Other Project Costs (OPC) for preliminary planning and design for future PIDAS replacements at Pantex and Y-12.	• Supports preliminary planning and design for future PIDAS replacement line item projects at Pantex and Y-12.

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 to address 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. 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 2017 budget does not request additional funds for the SIP. DNS will provide a funding plan for SIP by project as directed in the Consolidated Appropriations Act, 2016 including a prioritized list of discrete planned upgrade projects. NNSA estimates over $2,000,000,000 may be needed over a 15-year period to address security infrastructure and PIDAS upgrades.

Activities and Explanation of Changes

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 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 2017.	• A one-time addition of $30,000,000 in FY 2016 was provided to begin to address the backlog of security infrastructure upgrades. No follow on funding is requested in FY 2017. • The NNSA identified over $2,000,000,000 in security infrastructure upgrades needed. • NNSA will establish clear scope, cost, and schedule requirements for and provide a prioritized list of discrete upgrade projects planned for the SIP.

Defense Nuclear Security
Construction

Description

The DNS Construction supports critical facilities within the nuclear security enterprise. The FY 2017 Budget Request funds 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 (NSE), designed for the staging of SNM.

The Argus security system 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.

Activities and Explanation of Changes

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs FY 2016
Construction $13,000,000	**Construction $13,000,000**	**Construction $0**
• Replaces the obsolete PECOS alarm management system at the NNSS DAF with Argus, the current enterprise standard for Category I SNM protection.	• Completes the second phase of funding for the replacement of the PECOS system, including associated infrastructure, at the NNSS DAF with Argus.	• No change.

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 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021
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	90% Index	95% Index	95% Index	95% Index	95% Index
Result	90						
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.						
Physical Security Infrastructure Recapitalization – Implement and maintain a physical security life cycle management process, including on-time and to standard supplemental deliverables after implementation.							
Target	85% Index	90% Index	90% Index	95% Index	95% Index	95% Index	95% Index
Result	85						
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.						
Enterprise Risk Management – 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	90% Index	95% Index	95% Index	95% Index	95% Index
Result	90						
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.						

Defense Nuclear Security
Capital Summary

(Dollars in Thousands)

	Total	Prior Years	FY 2015 Enacted	FY 2015 Current	FY 2016 Enacted	FY 2017 Request	FY 2017 vs FY 2016 Request
Capital Operating Expenses Summary (including (Major Items of Equipment (MIE)							
Capital Equipment >$500K (including MIE)	N/A	N/A	0	0	0	0	0
Plant Projects (GPP) (<$10M)	N/A	N/A	5,040	5,040	5,151	5,264	+113
Total, Capital Operating Expenses	**N/A**	**N/A**	**5,040**	**5,040**	**5,151**	**5,264**	**+113**
Capital Equipment > $500K (including MIE)							
Total Non-MIE Capital Equipment (>$500K)	N/A	N/A	0	0	0	0	0
Total, Capital Equipment (including MIE)	N/A	N/A	**0**	**0**	**0**	**0**	**0**
Plant Projects (GPP and IGPP) (Total Estimated Cost (TEC) <$10M)							
Total Plant Projects (GPP) (Total Estimated Cost (TEC) <$5M)	N/A	N/A	5,040	5,040	5,151	5,264	+113
Total, Plant Projects (GPP) (Total Estimated Cost (TEC) <$10M)	N/A	N/A	**5,040**	**5,040**	**5,151**	**5,264**	**+113**
Total, Capital Summary	**N/A**	**N/A**	**5,040**	**5,040**	**5,151**	**5,264**	**+113**

Outyears for Defense Nuclear Security

(Dollars in Thousands)

	FY 2018 Request	FY 2019 Request	FY 2020 Request	FY 2021 Request
Capital Operating Expenses Summary (including (Major Items of Equipment (MIE)				
Capital Equipment >$500K (including MIE)	0	0	0	0
Plant Projects (GPP) (<$10M)	5,380	5,498	5,519	5,743
Total, Capital Operating Expenses	**5,380**	**5,498**	**5,519**	**5,743**
Capital Equipment > $500K (including MIE)				
Total Non-MIE Capital Equipment (>$500K)	0	0	0	0
Total, Capital Equipment (including MIE)	**0**	**0**	**0**	**0**
Plant Projects (GPP) (Total Estimated Cost (TEC) <$10M)				
Total Plant Projects (GPP) (Total Estimated Cost (TEC) <$5M)	5,380	5,498	5,519	5,743
Total, Plant Projects (GPP) (Total Estimated Cost (TEC) <$10M)	**5,380**	**5,498**	**5,519**	**5,743**
Total, Capital Summary	**5,380**	**5,498**	**5,519**	**5,743**

Defense Nuclear Security
Construction Projects Summary

(Dollars in Thousands)

	Total	Prior Years	FY 2015 Enacted	FY 2015 Current	FY 2016 Enacted	FY 2017 Request	FY 2017 vs FY 2016
14-D-710, Device Assembly Facility (DAF) Argus Installation, NNSS, Las Vegas, NV							
Total Estimated Cost (TEC)	29,633	3,633	0	0	13,000	13,000	0
Other Project Cost (OPC)	5,667	3,067	0	0	500	300	-200
TPC, 14-D-710, DAF/Argus, NNSS	**35,300**	**6,700**	**0**	**0**	**13,500**	**13,300**	**-200**
08-D-701, Nuclear Materials S&S Upgrade Project, Phase 2, LANL							
Total Estimated Cost (TEC)	221,051	221,051	0	0	0	0	0
Other Project Cost (OPC)	23,149	23,149	0	0	0	0	0
TPC, 08-D-701, NMSSUP, Phase 2, LANL	**244,200**	**244,200**	**0**	**0**	**0**	**0**	**0**
Total All Constructon Projects							
Total Estimated Cost (TEC)	250,684	224,684	0	0	13,000	13,000	0
Other Project Cost (OPC)	28,816	26,216	0	0	500	300	-200
Total Project Cost (TPC) All Construction Projects	**279,500**	**250,900**	**0**	**0**	**13,500**	**13,300**	**-200**

Outyears to Completion for Defense Nuclear Security

(Dollars in Thousands)

	FY 2018 Request	FY 2019 Request	FY 2020 Request	FY 2021 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	1,050	0	0
Total, 14-D-710, Device Assembly Facility (DAF) Argus Installation, NNSS, Las Vegas, NV	**750**	**1,050**	**0**	**0**
Total All Construction Projects				
Total Estimated Cost (TEC)	0	0	0	0
Other Project Cost (OPC)	750	1,050	0	0
Total Project Cost (TPC) All Construction Projects	**750**	**1,050**	**0**	**0**

Defense Nuclear Security
Other Information

Full Cost Recovery Estimates

(Dollars in Thousands)

	FY 2015 Current	FY 2016 Enacted	FY 2017 Request	FY 2017 vs FY 2016 $
Site				
Kansas City Plant	426	250	450	200
Lawrence Livermore National Laboratory	12,000	12,500	12,700	200
Los Alamos National Laboratory	3,674	3,900	4,700	800
Nevada National Security Site	2,000	0	0	0
NNSA Production Office	0	1,200	1,500	300
Sandia National Laboratories	16,500	17,000	17,500	500
Total	**34,600**	**34,850**	**36,850**	**2,000**

The FY 2017 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.

14-D-710, Device Assembly Facility (DAF) Argus Installation Project
Nevada National Security Site (NNSS), Las Vegas, NV
Project is for Design and Construction

1. Significant Changes and Summary

Significant Changes
This Construction Project Data Sheet (CPDS) is an update of the FY 2016 CPDS and does not include a new start for the Budget year.

Summary
The Performance Baseline is projected at a Total Estimated Cost (TEC) of $29,633 and a Total Project Cost (TPC) of $35,300 (including prior year funding under a minor construction project). This CPDS assumes a March 2016 project re-start. The projected completion date is fourth quarter (Q) FY 2019.

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

The DAF Argus Project (Argus) originated as a General Plant Project (GPP) in FY 2010, with planning commencing in FY 2011. In November 2012, during design and after the majority of equipment procurement, it was determined that the project would exceed the minor construction threshold. By January 2013, a decision was made to convert this GPP and complete it as a Line Item (LI) project. This action addressed the projected cost considerations and also supported an execution strategy believed to be more responsive to complex-wide lessons learned in implementing complex security projects. Argus completed most of the system design within the GPP execution period, and a significant level of conceptual planning followed by preliminary planning for startup testing, acceptance, cyber security, and system cut-over, as well as a commensurate amount of project management.

This CPDS includes the remaining design and all physical construction, startup, acceptance, and cut-over activities.

2. Critical Milestone History[a]

	CD-0	Conceptual Design Complete	CD-1	CD-2	Final Design Complete	CD-3	D&D Complete	CD-4
FY 2014	N/A	N/A	4QFY2013	4QFY2013	N/A	4QFY2013	N/A	4QFY2013
FY 2016	N/A	4QFY2016	4QFY2016	4QFY2016	4QFY2016	4QFY2016	N/A	4QFY2019
FY 2017	N/A	4QFY2016	4QFY2016	4QFY2016	4QFY2016	4QFY2016	N/A	4QFY2019

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 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

[a] The schedules and estimates are projections pending completion and approval of the Performance Baseline. Project was initiated as a General Plant Project that was not subject to the formal DOE Order 413.3B process. Nevada Site Office held decision meetings to start project after approval from NNSA HQ.

3. Project Cost History[a]

(dollars in thousands)

	(fiscal quarter or date)						
	TEC, Design	TEC, Construction	TEC, Total	OPC, Except D&D	OPC, D&D	OPC, Total	TPC
FY 2014	2,500	17,823	20,323	3,987	N/A	3,987	24,310
FY 2016[b]	3,500	26,133	29,633	5,667	N/A	5,667	35,300
FY 2017	3,500	26,133	29,633	5,667	N/A	5,667	35,300

4. Project Scope and Justification

Scope

The DAF Argus project primarily consists of the following items:

- Install and use Argus security system equipment and software as developed by the Lawrence Livermore National Laboratory (LLNL).
- Replace the existing multiplexers, badge readers, and key pads with Argus Field Panels and Remote Access Panels with integral fingerprint readers to control access/egress to DAF.
- Use the existing alarm sensors.
- Connect existing Perimeter Intrusion Detection and Assessment System (PIDAS) sensors to new Argus Field Panel-II (replacing existing PIDAS multiplexer panels) and to the new host computers in the Central Alarm Station (CAS) and Secondary Alarm Station (SAS).

Justification

The Argus security system will replace the aging Process Equipment and Control System (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 special nuclear material (SNM) using capabilities of the HSPD-12 badge credentials.

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 and nuclear explosive operations.

Operations conducted for the program missions include assembling, disassembling, modifying, staging, handling, transporting, and non-explosive testing of nuclear explosives and components, subcritical test assemblies, and other special operations involving high explosives (HE) and/or radioactive materials.

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

[a] The estimates are projections pending completion and approval of the Performance Baseline.

[b] No further physical construction activities will be performed until the project performance baseline has been validated and CD-2/3 has been approved.

5. Financial Schedule[a]

(dollars in thousands)

	Appropriations	Plan[b]	Obligations	Costs
Total Estimated Cost (TEC)				
Design				
FY 2010	N/A	981	N/A	0
FY 2011	N/A	519	N/A	600
FY 2012	N/A	0	N/A	900
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	2,000	N/A	2,000
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, Design	N/A	3,500	N/A	3,500
Construction				
FY 2011	N/A	2,133	N/A	700
FY 2012	N/A	0	N/A	900
FY 2013	N/A	0	N/A	533
FY 2014	N/A	0	N/A	0
FY 2015	N/A	0	N/A	0
FY 2016	N/A	11,000	N/A	3,900
FY 2017	N/A	13,000	N/A	9,800
FY 2018	N/A	0	N/A	9,599
FY 2019	N/A	0	N/A	701
Total, Construction	N/A	26,133	N/A	26,133

[a] The schedules and estimates are projections pending completion and approval of the Performance Baseline.

[b] Any funding prior to FY 2016 was appropriated under DNS Operations and Maintenance and conducted as a General Plant Project.

(dollars in thousands)

	Appropriations	Plan[a]	Obligations	Costs
TEC				
FY 2010	981	981	981	0
FY 2011	2,652	2,652	2,652	1,300
FY 2012	0	0	0	1,800
FY 2013	0	0	0	533
FY 2014	0	0	0	0
FY 2015	0	0	0	0
FY 2016	13,000	13,000	13,000	5,900
FY 2017	13,000	13,000	13,000	9,800
FY 2018	0	0	0	9,599
FY 2019	0	0	0	701
Total, TEC	29,633	29,633	29,633	29,633
Other Project Cost (OPC)				
OPC except D&D				
FY 2010	1,300	1,300	1,300	775
FY 2011	1,360	1,360	1,360	215
FY 2012	0	0	0	977
FY 2013	407	407	407	500
FY 2014	0	0	0	600
FY 2015	0	0	0	0
FY 2016	500	500	500	500
FY 2017	300	300	300	300
FY 2018	750	750	750	750
FY 2019	1,050	1,050	1,050	1,050
Total, OPC except D&D	5,667	5,667	5,667	5,667
Total OPC	5,667	5,667	5,667	5,667
Total Project Cost (TPC)				
FY 2010	2,281	2,281	2,281	775
FY 2011	4,012	4,012	4,012	1,515
FY 2012	0	0	0	2,777
FY 2013	407	407	407	1,033
FY 2014	0	0	0	600
FY 2015	0	0	0	0
FY 2016	13,500	13,500	13,500	6,400
FY 2017	13,300	13,300	13,300	10,100
FY 2018	750	750	750	10,349
FY 2019	1,050	1,050	1,050	1,751
Total, TPC	35,300	35,300	35,300	35,300

[a] Any funding prior to FY 2016 was appropriated under DNS Operations and Maintenance and conducted as a General Plant Project.

6. Details of Project Cost Estimate[a]

(dollars in thousands)

	Current Total Estimate	Previous Total Estimate	Original Validated Baseline
Total Estimated Cost (TEC)			
Design			
Design	2,900	2,900	N/A
Contingency	600	600	N/A
Total, Design	3,500	3,500	N/A
Construction			
Site Work	0	0	N/A
Long-lead Equipment	2,700	2,700	N/A
Construction	18,583	18,583	N/A
Contingency	4,850	4,850	N/A
Total, Construction	26,133	26,133	N/A
Total, TEC	29,633	29,633	N/A
Contingency, TEC	5,450	5,450	N/A
Other Project Cost (OPC)			
OPC except D&D			
Conceptual Planning	1,300	1,300	N/A
Conceptual Design	600	600	N/A
Start-up	2,817	2,817	N/A
Contingency	950	950	N/A
Total, OPC except D&D	5,667	5,667	N/A
Total, OPC	5,667	5,667	N/A
Contingency, OPC	950	950	N/A
Total, TPC	35,300	35,300	N/A
Total, Contingency	6,400	6,400	N/A

[a] The schedules and estimates are projections pending completion and approval of the Performance Baseline. When the Performance Baseline is approved, it will become the Original Validated Baseline.

7. Schedule of Appropriation Requests

		Prior Years	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	Outyears	Total
FY 2014	TEC	20,323	0	0	0	0	0	0	0	20,323
	OPC	2,987	500	500	0	0	0	0	0	3,987
	TPC	23,310	500	500	0	0	0	0	0	24,310
FY 2016	TEC	3,633	13,000	13,000	0	0	0	0	0	29,633
	OPC	3,067	500	300	750	1,050	0	0	0	5,667
	TPC	6,700	13,500	13,300	750	1,050	0	0	0	35,300
FY 2017	TEC	3,633	13,000	13,000	0	0	0	0	0	29,633
	OPC	3,067	500	300	750	1,050	0	0	0	5,667
	TPC	6,700	13,500	13,300	750	1,050	0	0	0	35,300

8. Related Operations and Maintenance Funding Requirements

Start of Operation of Beneficial Occupancy (fiscal quarter or date)	4QFY 2019
Expected Useful Life (number of years)	30
Expected Future Start of D&D of this capital asset (fiscal quarter)	2QFY 2049

(Related Funding Requirements)

(dollars in thousands)

	Annual Costs		Life Cycle Costs	
	Current Total Estimate	Previous Total Estimate	Current Total Estimate	Previous Total Estimate
Operations	426	NA	12,780	NA
Utilities	.5	NA	15	NA
Maintenance & Repair	120	NA	3,600	NA
Total	546.5	NA	16,395	NA

9. D&D Information

There is no new area being constructed in this construction project.

10. Acquisition Approach

Project was originated and executed as a GPP through FY 2013. It has been converted and will be completed as a LI project beginning in FY 2016. It is being executed by an integrated contractor team of LLNL (system design contractor), WSI-Nevada (system design and end-user/security contractor) and National Security Technologies (installation and site/facility managing and operating contractor).

Information Technology and Cybersecurity

Overview

The Information Technology and Cybersecurity Program is responsible for Information Sharing and Information Safeguarding to support the mission of the National Nuclear Security Administration (NNSA). The office supports Information Technology (IT) and Cybersecurity solutions, including continuous monitoring, cloud-based technologies, enterprise wireless and 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 mission. To ensure the protection of NNSA information and information assets, we will collaborate and coordinate with the Department of Energy (DOE) Office of the Chief Information Officer (OCIO) to develop, improve and implement information technology solutions and the Joint Cybersecurity Coordination Center (JC3). The requested funds for the Information Technology and Cybersecurity Program provide for the operation of cyber infrastructure at NNSA sites, implementation of requirements for classified computing environment directed by the Committee on National Security Systems (CNSS), and Public Key Infrastructure (PKI) capabilities for authentication to secret networks and applications.

The NNSA Information Technology and Cybersecurity Program is focused on the development of a suite of IT initiatives that provide an effective technology infrastructure support to the nuclear security mission and future 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 by future investments and the 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. Achieving these goals and objectives, NNSA will improve protection of information, information assets, counter new and evolving threats, educate and aid its workforce, and support 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 to focus its energy on improving both the performance of its staff and the security of the IT environment across the nuclear security enterprise. We will continue to maintain and modernize 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 to work diligently to evaluate risk and allocate resources to reduce threats in order to support the mission of the NNSA.

Highlights of the FY 2017 Budget Request

In FY 2017, the Information Technology and Cybersecurity Program plans to:

- Continue the modernization of the Enterprise Secure Network (ESN) by enhancing the core services, collaborative capabilities, and continuing to consolidate 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 some 66 and growing 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.
- Achieve Final Operating Capability (FOC) with the wide Identity Control and Access Management (ICAM) project at NNSA Headquarters and site elements. This entails ensuring the security of our facilities and the people and information that use them. We must be able to confirm identities. This includes people, computing/communications devices, networks, information systems, applications, and data, as well as DOE/NNSA and Service Component (SC) real property and other selective SC material (e.g., weapons systems).
- Achieve FOC on the CNSS, national, departmental, and local requirements. The CNSS is the interagency body responsible for safeguarding the National Security Systems. Their requirements include specific actions in the following six areas: access control**,** enterprise audit, insider threat, reduce anonymity, removable media, and continuous monitoring.
- Continue to leverage the NNSA Network Vision (2NV) framework to increase the efficiency and cost-effectiveness of NNSA IT services, consistent with the DOE IT Modernization Strategy and the Federal Information Technology Shared Services Strategy.
- Implement the NNSA Application Modernization Strategy which will seek to minimize the number of disparate NNSA Federal business and mission support IT applications in favor of a platform-based approach that will facilitate 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; and organized efforts 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 and oversite of risks and governance of this critical function.

Major Outyear Priorities and Assumptions

Outyear funding levels for Information Technology and Cybersecurity for FY 2018 through FY 2021 total $744,270,000. The NNSA Information Technology and Cybersecurity Program will continue to work toward transforming the information technology and cybersecurity environments to provide enhancement solutions. Priorities will focus on identifying Information Technology and Cybersecurity services that will support the NNSA mission areas and ensure the Program has direct responsibility for delivery of those services. Achieve by developing innovative solutions that look towards the future of NNSA with delivery of a more effective and affordable operating model aligned with business needs and accomplish within funding levels over the next five years by delivering capabilities to support the unclassified and classified technologies environment.

Information Technology and Cybersecurity
Funding

(Dollars in Thousands)

	FY 2015 Enacted	FY 2015 Current	FY 2016 Request	FY 2017 Request	FY 2017 vs FY 2016
Information Technology and Cybersecurity					
Cybersecurity					
Infrastructure Program	140,805	140,805	108,188	118,892	+10,704
Technology Application Development	4,000	4,000	6,000	4,000	-2,000
Total, Cybersecurity	**144,805**	**144,805**	**114,188**	**122,892**	**+8,704**
Enterprise Secure Computing	**10,000**	**10,000**	**18,400**	**23,700**	**+5,300**
Federal Unclassified Information Technology	**24,841**	**24,841**	**25,000**	**30,000**	**+5,000**
Total, Information Technology and Cybersecurity	**179,646**	**179,646**	**157,588**	**176,592**	**+19,004**

Outyears for Information Technology and Cybersecurity
Funding

(Dollars in Thousands)

	FY 2018 Request	FY 2019 Request	FY 2020 Request	FY 2021 Request
Information Technology and Cybersecurity				
Cybersecurity				
Infrastructure Program	121,243	124,683	128,339	139,135
Technology Application Development	4,000	4,000	4,000	4,000
Total, Cybersecurity	**125,243**	**128,683**	**132,339**	**143,135**
Enterprise Secure Computing	**23,485**	**25,625**	**26,395**	**19,365**
Federal Unclassified Information Technology	**30,000**	**30,000**	**30,000**	**30,000**
Total, Information Technology and Cybersecurity	**178,728**	**184,308**	**188,734**	**192,500**

Information Technology and Cybersecurity
Explanation of Major Changes
(Dollars in Thousands)

	FY 2017 vs FY 2016
Information Technology and Cybersecurity	
Cybersecurity: In addition to maintaining the Cybersecurity Infrastructure program which supports cybersecurity operations and activities at NNSA M&O and Federal sites, the increase will support the implementation of Continuous Diagnostics and Mitigation (CDM) and enhanced telecommunication services for the nuclear security enterprise.	+8,704
Enterprise Secure Computing: The increase continues the modernization of the ESN by enhancing the core services, collaborative capabilities, cyber security, continuing to consolidate disparate networks, continue deployment and operation of the PKI capabilities for authentication to secret networks and applications, and continue utilization of the Energy Sciences Network (ESNet) to provide a high performance networking environment.	+5,300
Federal Unclassified Information Technology: The increase provides the ability to maintain the existing unclassified commodity (such as desktop computers, application hosting, printers and mobile devices) and mission information technology capability.	+5,000
Total, Information Technology and Cybersecurity	**+19,004**

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 that 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 will support short and long-term solutions to specific cybersecurity needs at NNSA sites and headquarters locations and will focus on emerging technologies and leveraging existing technology resources to create a more secure environment.

FY 2018-FY 2021 Key Milestones

FY 2018

- Implementation of full Operating Capability of Telecommunications Security Program
- Consolidate Cybersecurity Awareness Training programs across the nuclear security enterprise into a single offering
- Review strategic sourcing options leveraging lessons learned from Department of Defense (DOD) and other departments and agencies and develop alternative plans to expand cybersecurity capabilities

FY 2019

- Implementation of Automated Authority to Operate leveraging Continuous Monitoring and Continuous Diagnostics and Mitigation capabilities for non-National Security Systems
- Establish department-wide cybersecurity sensor platform solution to enhance capabilities and functionality and reduce duplication

FY 2020

- Begin implementation of Cybersecurity Centers of Excellence across NNSA with the centers providing specialized services to each NNSA site

FY 2021

- Cybersecurity Infrastructure enhancements and capability refresh

Activities and Explanation of Changes

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs FY 2016
Cybersecurity $114,188,000	**Cybersecurity $122,892,000**	**Cybersecurity +$8,704,000**
Infrastructure Program $108,188,000	**Infrastructure Program $118,892,000**	**Infrastructure Program +$10,704,000**
• Complete move to new building for JC3 IARC. • Start the replacement of aging IT/Cyber infrastructure components. • Finalize implementation of the NNSA Continuous Asset Monitoring Program within the classified computing environment. • Complete FOC for CNSS requirements.	• Continue to fund fully the Cybersecurity programs at each of the national security laboratories, plants, and sites to defend appropriately against the steadily increasing threats. • Implement Initial Operating Capability (IOC) of Telecommunications Security Program within NNSA.	• Funds the Cybersecurity programs through staff augmentation to handle an increase in workload to maintain the Cybersecurity program at each of the national security laboratories, plants and Federal sites. • Supports enterprise operations, enterprise allocation support, and defense against the steadily increasing threats through defense in depth, to include CDM and Telecommunication Security.
Technology Application Development $6,000,000	**Technology Application Development $4,000,000**	**Technology Application Development -$2,000,000**
• Support the cyber research to focus on higher-risk game-changing technologies targeted towards solving fundamental cybersecurity problems related to protecting the nuclear security enterprise. The research will focus on the following three signature programs: • Resilience and Assurance • Big Data and Behavioral Cyber Analytics • Scalable Testing of Cyber System Dynamics	• Support research and development on enhanced secure protocol standards specifically designed for Restricted Data in transmission and at rest.	• An additional $2M was requested in FY 2016 to support the department' implementation of a comprehensive research and development imitative for the Cybersecurity program such as the enhanced monitoring of high speed networks and cyber defensive capabilities such as malware detection and virtual labs for code review.

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 Enterprise Secure Network (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 provides 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 provides 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; 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 our network in order to provide our services to the enterprise. An example of this is the ongoing project to implement PKI smart cards on the NSN and ESN, which entails issuing tokens and enabling network login to the DOE Secret Fabric users to satisfy Steering Committee IOC/FOC goals to Reduce Anonymity. Another example is that the NSN/ESN frequently leverages the Office of Science ESNet infrastructure for the network transport layer.

ESN is also serving 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 the disparate DOE/NNSA entities to share information. An effort to consolidate disparate classified networks is currently underway. This will assist the NNSA Information Technology and Cybersecurity Program to manage more effectively classified information and to maximize the actual networks, infrastructures and capabilities into a greater whole. In addition, an enterprise-wide project is underway to consolidate services within a cloud structure, enhance system availability and reliability in the infrastructure and provide additional security measures.

The NSN/ESN is currently deployed at each NNSA and multiple DOE sites, other departments and organizations, and select allied nations. There are additional sites being integrated and limited cross-domain capabilities.

FY 2018-FY 2021 Key Milestones
FY 2018
- ESN: Classified Voice over Internet Protocol (VoIP)
- ESN: Integrate OneID data into ESN Identity and Access Management data

FY 2019
- ESN: Classified VoIP

FY 2020
- ESN: Implement an enterprise classified electronic records system service

FY 2021
- ESN: Remote processing capabilities

Activities and Explanation of Changes

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs FY 2016
Enterprise Secure Computing $18,400,000	**Enterprise Secure Computing $23,700,000**	**Enterprise Secure Computing +$5,300,000**
• Upgrade and enhance classified applications and services to improve collaboration and information sharing. • Transition participating sites to enterprise VDI. • Expand NSI infrastructure to provision commodity services. • Two-factor authentication PKI for Secret/Restricted Data infrastructure. • Implement high performance desktop computing. • Recapitalization of the enterprise secure network.	• Continue to upgrade and enhance classified applications and services to improve collaboration and information sharing. • Enhance cross-domain capability. • Continue the transition of participating sites to enterprise VDI. • Continue the expansion of NSI infrastructure to provision commodity services. • 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 consolidating services and disparate networks within a cloud structure. • Continue enhancing 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.	• Funding increase addresses high program risk that limits the continued modernization of the ESN by enhancing the core services, collaborative capabilities, consolidation of services and disparate networks within a cloud structure. • Funding enables continued deployment and operation of the PKI capabilities for authentication to secret networks and applications, to include the ability for Program Offices to support weapon design and development in addition to providing additional security measures and utilization of the ESNet.

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 accomplishment of 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 and reproduction and forms management services.

Federal Unclassified Information Technology provides commodity computing infrastructure, which seeks to facilitate effective collaboration and information sharing that is necessary for NNSA Federal employees and support contractors to execute the NNSA mission. The NNSA Network Vision (2NV) and strategy will shift NNSA from a traditional, costly desktop and on-premise application support model to a cloud-based application hosting and virtual desktop solution. Each of the investments in the 2NV portfolio directly supports a cybersecurity outcome. OneVoice provides an encrypted collaboration suite for multi-site communications; OneNNSA Network provides a secure encrypted wide area network solution over the ESNET network; and OneID provides secure authentication across NNSA's multiple sites, and provides a platform for implementing single sign-on capabilities. In order to think, behave, and respond as one cohesive agency with a shared, critical national security mission, it is necessary to re-engineer our telecommunications networks and continuously improve our service offerings in order to remove the technical barriers to collaboration and to outfit our employees with the effective communication tools to maximize their efficiency and lower operational costs.

FY 2018-FY 2021 Key Milestones

FY 2018

- Enterprise VoIP as a service
- Leverage OneID data for single sign-on capability for Federal enterprise applications
- Application modernization

FY 2019

- Enterprise VOIP as a service
- Leverage OneID data for single sign-on capability for Federal enterprise applications
- Application modernization

FY 2020

- Unclassified mobile application development

FY 2021

- Unclassified mobile application development

Activities and Explanation of Changes

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs FY 2016
Federal Unclassified Information Technology $25,000,000	**Federal Unclassified Information Technology $30,000,000**	**Federal Unclassified Information Technology +$5,000,000**
• Continue to support the deployment 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. • Coordinate and oversee the delivery of Federal desktop services as provisioned by the Department of Energy. • Provide IT technical services and incidental advisory and assistance services. • Oversee the implementation of hardware and software licensing, maintenance and refresh. • Provide funding to field offices for IT services provisioned by their M&O partners. • Work with the NNSA M&O partners to begin the implementation of a shared services model within the YourCloud environment. • Provide oversight of the M&O partners' unclassified IT programs. • Develop and Implement the application modernization project.	• Continue to support the deployment 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. • Coordinate and oversee the delivery of Federal desktop and video teleconferencing services. • Continue to provide IT technical services and incidental advisory and assistance services. • Continue to oversee the implementation of hardware and software licensing, maintenance and refresh. • Continue to provide funding to field offices for IT services provisioned by their M&O partners. • Continue to work with the NNSA M&O partners to implement and operate a shared services model within the YourCloud environment. • Continue to provide oversight of the M&O partners' unclassified IT programs. • Continue the implementation of the application modernization project.	• Capital investments used toward accelerating the improvement of Federal unclassified information technology commodity, collaboration, and business/mission support services.

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 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021
Cybersecurity Assessment Reviews - Annual Percentage of Cybersecurity Site Assessment Reviews conducted by the Office of Enterprise Assessments (EA) and 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	100% of reviews resulting in "effective" rating	100% of reviews resulting in "effective" rating	100% of reviews resulting in "effective" rating	100% of reviews resulting in "effective" rating
Result	100						
Endpoint Target	Annually, achieve at least an effective rating of 100% of OCIO site assistance visits (SAV) Cybersecurity reviews.						

Information Technology and Cybersecurity
Other Information

Full Cost Recovery Estimates

(Dollars in Thousands)

	FY 2015 Current	FY 2016 Request	FY 2017 Request	FY 2017 vs FY 2016 $
Site				
Kansas City Plant	185	400	400	0
Lawrence Livermore National Laboratory	2,600	2,200	3,200	+1,000
Los Alamos National Laboratory	3,200	1,400	1,400	0
Nevada National Security Site	600	600	600	0
National Production Office	20	80	80	0
Sandia National Laboratories	3,600	8,000	8,000	0
Total	**10,205**	**12,680**	**13,680**	**+1,000**

The FY 2017 Budget Request provides direct funding for mission-driven activities focused on research and development of information technology 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 Strategic Partnership Program customers as work is accomplished at the contractor site. The table above provides an estimate of costs that will be recovered from SPP customers.

Domestic Uranium Enrichment
Funding

(Dollars in Thousands)

	FY 2015 Enacted	FY 2015 Current	FY 2016 Request	FY 2017 Request	FY 2017 vs FY 2016
Domestic Uranium Enrichment					
Operations and Maintenance (O&M)	97,200	97,200	0	0	0
Domestic Uranium Enrichment Research, Development and Demonstration	0	0	0	0	0
Total, Domestic Uranium Enrichment	**97,200**	**97,200**	**0**	**0**	**0**

[a] Funding reflects the transfer of Domestic Uranium Enrichment to Strategic Materials program within the Directed Stockpile Work program, in accordance with the Consolidated Appropriations Act, 2016.

Department Of Energy

FY 2017 Congressional Budget

Funding By Appropriation By Site

($K)

Weapons Activities	FY 2015 Current	FY 2016 Enacted	FY 2017 Request
Argonne National Laboratory			
Science			
Science Campaign	1,200	0	0
Advanced Simulation & Computing			
Advanced Simulation & Computing Campaign	500	500	0
Infrastructure and Operations			
Infrastructure and Operations	20	10	0
Nuclear Counterterrorism Incident Response			
Nuclear Counterterrorism Incident Response	2,290	0	0
Total, Argonne National Laboratory	**4,010**	**510**	**0**
Bechtel Marine Propulsion Center			
Infrastructure and Operations			
Infrastructure and Operations	826	1,450	1,330
Total, Bechtel Marine Propulsion Center	**826**	**1,450**	**1,330**
Brookhaven National Laboratory			
Counterterrorism and Counterproliferation Programs			
Counterterrorism and Counterproliferation Programs	50	0	0
Infrastructure and Operations			
Infrastructure and Operations	200	200	235
Nuclear Counterterrorism Incident Response			
Nuclear Counterterrorism Incident Response	1,635	0	0
Total, Brookhaven National Laboratory	**1,885**	**200**	**235**
Chicago Operations Office			
Science			
Science Campaign	100	0	0
Advanced Simulation & Computing			
Advanced Simulation & Computing Campaign	2,080	290	0
Total, Chicago Operations Office	**2,180**	**290**	**0**
Consolidated Business Center			
Site Stewardship			
Site Stewardship	430	0	0
Infrastructure and Operations			
Infrastructure and Operations	0	470	0
Total, Consolidated Business Center	**430**	**470**	**0**
General Atomics Site			
Inertial Confinement Fusion Ignition High Yield			
Inertial Confinement Fusion Ignition High Yield Campaign	22,973	24,000	24,420
Total, General Atomics Site	**22,973**	**24,000**	**24,420**

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FY 2017 Congressional Budget

Funding By Appropriation By Site

($K)

Weapons Activities	FY 2015 Current	FY 2016 Enacted	FY 2017 Request
Idaho National Laboratory			
Directed Stockpile Work			
Directed Stockpile Work	2,605	5,285	3,065
Infrastructure and Operations			
Infrastructure and Operations	0	745	0
Nuclear Counterterrorism Incident Response			
Nuclear Counterterrorism Incident Response	3,582	0	0
Total, Idaho National Laboratory	**6,187**	**6,030**	**3,065**
Kansas City National Security Complex (KCNSC)			
Directed Stockpile Work			
Directed Stockpile Work	300,949	331,385	323,669
Site Stewardship			
Site Stewardship	5,869	0	0
Counterterrorism and Counterproliferation Programs			
Counterterrorism and Counterproliferation Programs	250	0	0
Engineering			
Engineering Campaign	2,707	3,102	2,428
Advanced Simulation & Computing			
Advanced Simulation & Computing Campaign	500	500	0
Defense Nuclear Security			
Defense Nuclear Security	11,530	11,423	11,651
Readiness Campaign			
Readiness Campaign	0	0	0
Information technology and Cybersecurity			
Information technology and Cybersecurity	6,656	5,576	5,576
Secure Transportation Asset			
Secure Transportation Asset	14,415	17,700	17,676
Nuclear Counterterrorism Incident Response			
Nuclear Counterterrorism Incident Response	18,322	0	0
Advanced Manufacturing Development			
Advanced Manufacturing Development	51,249	46,344	15,338
Total, Kansas City National Security Complex (KCNSC)	**412,447**	**416,030**	**376,338**
Kansas City Site Office			
Site Stewardship			
Site Stewardship	180	0	0
Infrastructure and Operations			
Infrastructure and Operations	174,592	179,655	339,112
Total, Kansas City Site Office	**174,772**	**179,655**	**339,112**

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($K)

Weapons Activities	FY 2015 Current	FY 2016 Enacted	FY 2017 Request
Lawrence Berkeley National Laboratory			
Advanced Simulation & Computing			
Advanced Simulation & Computing Campaign	5,000	5,000	0
Total, Lawrence Berkeley National Laboratory	**5,000**	**5,000**	**0**
Lawrence Livermore National Laboratory			
Directed Stockpile Work			
Directed Stockpile Work	135,886	202,052	181,444
Science			
Science Campaign	120,033	118,190	127,391
Site Stewardship			
Site Stewardship	25,814	0	0
Counterterrorism and Counterproliferation Programs			
Counterterrorism and Counterproliferation Programs	14,900	0	0
Engineering			
Engineering Campaign	21,278	19,355	17,310
Inertial Confinement Fusion Ignition High Yield			
Inertial Confinement Fusion Ignition High Yield Campaign	328,159	326,591	314,081
Advanced Simulation & Computing			
Advanced Simulation & Computing Campaign	191,513	216,676	171,803
Defense Nuclear Security			
Defense Nuclear Security	52,024	51,538	52,569
Information technology and Cybersecurity			
Information technology and Cybersecurity	16,212	13,125	13,125
Infrastructure and Operations			
Infrastructure and Operations	110,032	135,746	184,240
Nuclear Counterterrorism Incident Response			
Nuclear Counterterrorism Incident Response	20,204	0	0
Advanced Manufacturing Development			
Advanced Manufacturing Development	7,695	10,800	8,010
Total, Lawrence Livermore National Laboratory	**1,043,750**	**1,094,073**	**1,069,973**
Livermore Site Office			
Site Stewardship			
Site Stewardship	175	0	0
Total, Livermore Site Office	**175**	**0**	**0**

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($K)

Weapons Activities	FY 2015 Current	FY 2016 Enacted	FY 2017 Request
Los Alamos National Laboratory			
Directed Stockpile Work			
Directed Stockpile Work	501,090	611,735	580,868
Science			
Science Campaign	141,515	138,348	147,465
Site Stewardship			
Site Stewardship	3,143	0	0
Counterterrorism and Counterproliferation Programs			
Counterterrorism and Counterproliferation Programs	14,693	0	0
Engineering			
Engineering Campaign	24,526	25,768	22,969
Inertial Confinement Fusion Ignition High Yield			
Inertial Confinement Fusion Ignition High Yield Campaign	16,594	16,000	12,810
Advanced Simulation & Computing			
Advanced Simulation & Computing Campaign	224,968	219,556	175,106
Defense Nuclear Security			
Defense Nuclear Security	100,979	99,951	101,950
Information technology and Cybersecurity			
Information technology and Cybersecurity	15,985	15,227	15,227
Infrastructure and Operations			
Infrastructure and Operations	411,535	557,700	510,675
Nuclear Counterterrorism Incident Response			
Nuclear Counterterrorism Incident Response	23,772	0	0
Advanced Manufacturing Development			
Advanced Manufacturing Development	7,450	11,400	8,772
Total, Los Alamos National Laboratory	**1,486,250**	**1,695,685**	**1,575,842**
Los Alamos Site Office			
Infrastructure and Operations			
Infrastructure and Operations	50	0	0
Total, Los Alamos Site Office	**50**	**0**	**0**

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Funding By Appropriation By Site

($K)

Weapons Activities	FY 2015 Current	FY 2016 Enacted	FY 2017 Request
National Energy Technology Lab			
Directed Stockpile Work			
Directed Stockpile Work	11,066	8,101	8,216
Engineering			
Engineering Campaign	1,253	420	0
Inertial Confinement Fusion Ignition High Yield			
Inertial Confinement Fusion Ignition High Yield Campaign	107	0	0
Advanced Simulation & Computing			
Advanced Simulation & Computing Campaign	0	136	0
Readiness Campaign			
Readiness Campaign	0	0	0
Infrastructure and Operations			
Infrastructure and Operations	325	0	0
Advanced Manufacturing Development			
Advanced Manufacturing Development	1,335	1,200	0
Total, National Energy Technology Lab	**14,086**	**9,857**	**8,216**
Naval Research Laboratory			
Inertial Confinement Fusion Ignition High Yield			
Inertial Confinement Fusion Ignition High Yield Campaign	5,350	6,450	6,310
Total, Naval Research Laboratory	**5,350**	**6,450**	**6,310**
Nevada Field Office			
Directed Stockpile Work			
Directed Stockpile Work	0	1,100	0
Defense Nuclear Security			
Defense Nuclear Security	68,885	68,244	72,057
Information technology and Cybersecurity			
Information technology and Cybersecurity	4,228	4,000	4,000
Infrastructure and Operations			
Infrastructure and Operations	920	0	0
Total, Nevada Field Office	**74,033**	**73,344**	**76,057**

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($K)

Weapons Activities	FY 2015 Current	FY 2016 Enacted	FY 2017 Request
Nevada National Security Site			
Directed Stockpile Work			
Directed Stockpile Work	38,247	47,885	47,964
Science			
Science Campaign	56,516	52,569	47,748
Inertial Confinement Fusion Ignition High Yield			
Inertial Confinement Fusion Ignition High Yield Campaign	10	0	0
Advanced Simulation & Computing			
Advanced Simulation & Computing Campaign	3,352	0	0
Defense Nuclear Security			
Defense Nuclear Security	0	13,000	13,000
Infrastructure and Operations			
Infrastructure and Operations	150,722	152,668	206,188
Secure Transportation Asset			
Secure Transportation Asset	209	207	241
Nuclear Counterterrorism Incident Response			
Nuclear Counterterrorism Incident Response	47,502	0	0
Total, Nevada National Security Site	**296,558**	**266,329**	**315,141**
NNSA Albuquerque Complex			
Directed Stockpile Work			
Directed Stockpile Work	76,008	234,609	169,233
Science			
Science Campaign	32,955	45,334	33,528
Engineering			
Engineering Campaign	0	6,889	20,025
Inertial Confinement Fusion Ignition High Yield			
Inertial Confinement Fusion Ignition High Yield Campaign	13,421	20,429	9,492
Advanced Simulation & Computing			
Advanced Simulation & Computing Campaign	18,999	27,612	0
Defense Nuclear Security			
Defense Nuclear Security	7,453	7,240	7,385
Information technology and Cybersecurity			
Information technology and Cybersecurity	3,500	0	0
Infrastructure and Operations			
Infrastructure and Operations	200	13,120	17,782
Secure Transportation Asset			
Secure Transportation Asset	183,178	183,438	210,040
Nuclear Counterterrorism Incident Response			
Nuclear Counterterrorism Incident Response	3,667	0	0
Advanced Manufacturing Development			
Advanced Manufacturing Development	34	6,781	5,206
Total, NNSA Albuquerque Complex	**339,415**	**545,452**	**472,691**

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Funding By Appropriation By Site

($K)

Weapons Activities	FY 2015 Current	FY 2016 Enacted	FY 2017 Request
NNSA Production Office (NPO)			
Directed Stockpile Work			
Directed Stockpile Work	0	1,000	1,830
Site Stewardship			
Site Stewardship	17,319	0	0
Nuclear Counterterrorism Incident Response			
Nuclear Counterterrorism Incident Response	3,687	0	0
Total, NNSA Production Office (NPO)	**21,006**	**1,000**	**1,830**
NNSA Production Site Office			
Site Stewardship			
Site Stewardship	200	0	0
Infrastructure and Operations			
Infrastructure and Operations	2,987	0	0
Total, NNSA Production Site Office	**3,187**	**0**	**0**
Oak Ridge Institute for Science & Education			
Science			
Science Campaign	210	237	100
Counterterrorism and Counterproliferation Programs			
Counterterrorism and Counterproliferation Programs	200	0	0
Inertial Confinement Fusion Ignition High Yield			
Inertial Confinement Fusion Ignition High Yield Campaign	160	60	0
Nuclear Counterterrorism Incident Response			
Nuclear Counterterrorism Incident Response	13,146	0	0
Total, Oak Ridge Institute for Science & Education	**13,716**	**297**	**100**
Oak Ridge National Laboratory			
Directed Stockpile Work			
Directed Stockpile Work	0	32,083	2,353
Site Stewardship			
Site Stewardship	1,542	0	0
Counterterrorism and Counterproliferation Programs			
Counterterrorism and Counterproliferation Programs	950	0	0
Advanced Simulation & Computing			
Advanced Simulation & Computing Campaign	755	25	0
Infrastructure and Operations			
Infrastructure and Operations	3,258	4,240	3,475
Nuclear Counterterrorism Incident Response			
Nuclear Counterterrorism Incident Response	1,215	0	0
Advanced Manufacturing Development			
Advanced Manufacturing Development	20	0	0
Total, Oak Ridge National Laboratory	**7,740**	**36,348**	**5,828**

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($K)

Weapons Activities	FY 2015 Current	FY 2016 Enacted	FY 2017 Request
Oak Ridge Office			
Domestic Uranium Enrichment RD&D			
Domestic Uranium Enrichment RD&D	97,200	0	0
Total, Oak Ridge Office	**97,200**	**0**	**0**
Office of Scientific & Technical Information			
Science			
Science Campaign	200	200	200
Information technology and Cybersecurity			
Information technology and Cybersecurity	213	213	213
Total, Office of Scientific & Technical Information	**413**	**413**	**413**
Pacific Northwest National Laboratory			
Directed Stockpile Work			
Directed Stockpile Work	24,712	23,082	23,067
Science			
Science Campaign	5	20	0
Site Stewardship			
Site Stewardship	827	0	0
Counterterrorism and Counterproliferation Programs			
Counterterrorism and Counterproliferation Programs	50	0	0
Engineering			
Engineering Campaign	1,345	2,185	0
Readiness Campaign			
Readiness Campaign	0	0	0
Infrastructure and Operations			
Infrastructure and Operations	3,116	2,400	3,000
Nuclear Counterterrorism Incident Response			
Nuclear Counterterrorism Incident Response	2,905	0	0
Total, Pacific Northwest National Laboratory	**32,960**	**27,687**	**26,067**

Department Of Energy

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($K)

Weapons Activities	FY 2015 Current	FY 2016 Enacted	FY 2017 Request
Pantex Plant			
Directed Stockpile Work			
Directed Stockpile Work	222,324	316,897	369,106
Engineering			
Engineering Campaign	1,887	1,891	2,068
Defense Nuclear Security			
Defense Nuclear Security	128,000	125,422	129,238
Information technology and Cybersecurity			
Information technology and Cybersecurity	7,273	6,822	6,822
Infrastructure and Operations			
Infrastructure and Operations	183,688	191,016	178,913
Secure Transportation Asset			
Secure Transportation Asset	5,948	8,184	8,566
Advanced Manufacturing Development			
Advanced Manufacturing Development	100	3,950	4,153
Total, Pantex Plant	**549,220**	**654,182**	**698,866**
Pantex Site Office			
Readiness Campaign			
Readiness Campaign	0	0	0
Total, Pantex Site Office	**0**	**0**	**0**
Richland Operations Office			
Nuclear Counterterrorism Incident Response			
Nuclear Counterterrorism Incident Response	1,550	0	0
Total, Richland Operations Office	**1,550**	**0**	**0**

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($K)

Weapons Activities	FY 2015 Current	FY 2016 Enacted	FY 2017 Request
Sandia National Laboratories			
Directed Stockpile Work			
Directed Stockpile Work	972,110	986,508	956,084
Science			
Science Campaign	45,199	40,402	44,811
Site Stewardship			
Site Stewardship	7,002	0	0
Counterterrorism and Counterproliferation Programs			
Counterterrorism and Counterproliferation Programs	10,500	0	0
Engineering			
Engineering Campaign	76,871	67,881	66,552
Inertial Confinement Fusion Ignition High Yield			
Inertial Confinement Fusion Ignition High Yield Campaign	46,545	44,390	50,520
Advanced Simulation & Computing			
Advanced Simulation & Computing Campaign	144,321	146,433	149,282
Defense Nuclear Security			
Defense Nuclear Security	58,361	64,817	66,113
Readiness Campaign			
Readiness Campaign	0	0	0
Information technology and Cybersecurity			
Information technology and Cybersecurity	17,928	16,653	16,653
Infrastructure and Operations			
Infrastructure and Operations	151,413	166,155	175,413
Secure Transportation Asset			
Secure Transportation Asset	16,160	27,587	46,204
Nuclear Counterterrorism Incident Response			
Nuclear Counterterrorism Incident Response	24,058	0	0
Advanced Manufacturing Development			
Advanced Manufacturing Development	13,585	15,069	8,275
Total, Sandia National Laboratories	**1,584,053**	**1,575,895**	**1,579,907**
Savannah River Operations Office			
Directed Stockpile Work			
Directed Stockpile Work	1,629	54	1,361
Total, Savannah River Operations Office	**1,629**	**54**	**1,361**

Department Of Energy

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($K)

Weapons Activities	FY 2015 Current	FY 2016 Enacted	FY 2017 Request
Savannah River Site			
Directed Stockpile Work			
Directed Stockpile Work	90,016	110,407	103,249
Site Stewardship			
Site Stewardship	980	0	0
Engineering			
Engineering Campaign	1,900	1,542	1,618
Defense Nuclear Security			
Defense Nuclear Security	6,894	6,830	6,967
Information technology and Cybersecurity			
Information technology and Cybersecurity	4,944	4,000	4,000
Infrastructure and Operations			
Infrastructure and Operations	125,555	110,925	129,270
Nuclear Counterterrorism Incident Response			
Nuclear Counterterrorism Incident Response	3,154	0	0
Advanced Manufacturing Development			
Advanced Manufacturing Development	5,148	8,200	5,071
Total, Savannah River Site	**238,591**	**241,904**	**250,175**
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	1,800	0	0
Total, SLAC National Accelerator Laboratory	**1,800**	**0**	**0**
University of Rochester			
Inertial Confinement Fusion Ignition High Yield			
Inertial Confinement Fusion Ignition High Yield Campaign	67,963	64,264	61,830
Total, University of Rochester	**67,963**	**64,264**	**61,830**

Department Of Energy

FY 2017 Congressional Budget

Funding By Appropriation By Site

($K)

Weapons Activities	FY 2015 Current	FY 2016 Enacted	FY 2017 Request
Washington Headquarters			
Directed Stockpile Work			
Directed Stockpile Work	82,461	87,593	161,660
Science			
Science Campaign	12,358	27,759	40,741
Site Stewardship			
Site Stewardship	13,050	0	0
Counterterrorism and Counterproliferation Programs			
Counterterrorism and Counterproliferation Programs	4,500	0	0
Engineering			
Engineering Campaign	1,974	98	4,185
Inertial Confinement Fusion Ignition High Yield			
Inertial Confinement Fusion Ignition High Yield Campaign	11,613	8,866	43,496
Advanced Simulation & Computing			
Advanced Simulation & Computing Campaign	5,765	6,028	166,993
Defense Nuclear Security			
Defense Nuclear Security	37,575	64,048	33,641
Readiness Campaign			
Readiness Campaign	0	0	0
Legacy Contractor Pensions			
Legacy Contractor Pensions	307,058	283,887	248,492
Information technology and Cybersecurity			
Information technology and Cybersecurity	97,525	85,151	104,155
Infrastructure and Operations			
Infrastructure and Operations	51,552	99,535	121,099
Secure Transportation Asset			
Secure Transportation Asset	14	0	0
Nuclear Counterterrorism Incident Response			
Nuclear Counterterrorism Incident Response	7,440	0	0
Advanced Manufacturing Development			
Advanced Manufacturing Development	1,223	1,174	1,758
Total, Washington Headquarters	**634,108**	**664,139**	**926,220**
Waste Isolation Pilot Plant			
Infrastructure and Operations			
Infrastructure and Operations	2,000	0	0
Nuclear Counterterrorism Incident Response			
Nuclear Counterterrorism Incident Response	61	0	0
Total, Waste Isolation Pilot Plant	**2,061**	**0**	**0**

Department Of Energy

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Funding By Appropriation By Site

($K)

Weapons Activities	FY 2015 Current	FY 2016 Enacted	FY 2017 Request
Y-12 National Security Complex			
Directed Stockpile Work			
Directed Stockpile Work	250,628	388,016	397,358
Engineering			
Engineering Campaign	2,264	2,246	2,332
Advanced Simulation & Computing			
Advanced Simulation & Computing Campaign	247	250	0
Information technology and Cybersecurity			
Information technology and Cybersecurity	5,182	6,821	6,821
Secure Transportation Asset			
Secure Transportation Asset	0	2	5
Total, Y-12 National Security Complex	**258,321**	**397,335**	**406,516**
Y-12 Site Office			
Defense Nuclear Security			
Defense Nuclear Security	164,422	170,378	175,562
Infrastructure and Operations			
Infrastructure and Operations	660,571	663,089	851,220
Advanced Manufacturing Development			
Advanced Manufacturing Development	19,361	25,138	30,522
Total, Y-12 Site Office	**844,354**	**858,605**	**1,057,304**
Total, Weapons Activities	**8,250,249**	**8,846,948**	**9,285,147**

Defense Nuclear Nonproliferation

Defense Nuclear Nonproliferation

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, [$1,940,302,000] *$1,821,916,000* to remain available until expended.

Explanation of Change

Change from the language proposed in FY 2016 consists of a change to the requested funding amount.

Public Law Authorizations

- P.L. 106-65, National Nuclear Security Administration Act, as amended
- P.L. 114-92, National Defense Authorization Act for Fiscal Year 2016

Defense Nuclear Nonproliferation

(Dollars in Thousands)

	FY 2015 Enacted	FY 2015 Current	FY 2016 Enacted	FY 2017 Request
Defense Nuclear Nonproliferation	1,641,369	1,638,772	1,940,302	1,821,916
Rescission of Prior Year Balances	-26,121	-26,121	0	-14,000
Total DNN, Net of Rescissions	**1,615,248**	**1,612,651**	**1,940,302**	**1,807,916**

Overview

Nuclear threat reduction is one of the three pillars of the NNSA mission, as identified in the *2015 DOE/NNSA Enterprise Strategic Vision.* To achieve this mission, the NNSA strategy is to address 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 incidents.

Starting in FY 2016, all funding for NNSA's threat reduction activities has been consolidated in the Defense Nuclear Nonproliferation (DNN) appropriation. This appropriation funds the Defense Nuclear Nonproliferation (DNN) program, which primarily supports efforts to prevent nuclear threats, 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 relating to weapons of mass destruction; advance technologies that detect the proliferation of weapons of mass destruction worldwide; eliminate and secure inventories of surplus materials and infrastructure usable for nuclear weapons; 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 or weapons-usable material, nuclear and dual-use commodities and technology, or nuclear-related expertise that could be used to develop nuclear weapon capabilities by states or non-state actors.

These activities are carried out within 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); the pressure on arms control and nonproliferation regimes from enduring interest in nuclear weapons capabilities by state- and non-state actors; the global expansion of nuclear power and possible spread of fuel cycle technology; the increasing opportunities for illicit nuclear material trafficking due to expanding global trade volumes and increasingly sophisticated procurement networks; and the rapid advance of technology (including cyber) that may shorten nuclear weapon development pathways and directly affect nuclear safeguards and security missions. The major elements of the appropriation account include the following:

Material Management and Minimization (M^3)

M3 presents an integrated approach to addressing the persistent threat posed by nuclear materials through a full cycle of materials management and minimization efforts. Consistent with the priorities articulated in the National Security Strategy of the United States and the Nuclear Posture Review, 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. Increases in FY 2017 are to accelerate reactor conversions in Kazakhstan and the United States; fully fund cooperative agreements to support the establishment of a reliable, domestic, non-HEU-based production capability for Mo-99; implement the Uranium Lease and Take Back (ULTB) Program; and, offset the depletion of prior-year uncosted balances in the U.S. plutonium disposition program. These increases are partially offset by a decrease in funding needed for fuel return efforts following the completion of key removals for the 2016 Nuclear Security Summit and the use of uncosted balances expected to be available to continue to support Russian-origin and Gap removal projects.

Global Material Security (GMS)

Supports the President's nuclear security agenda and the Secretary's goal of enhancing nuclear security through nonproliferation by working with partner countries to increase the security of vulnerable stockpiles of nuclear weapons, weapons-usable nuclear materials, and radiological materials and to improve partner countries' abilities to deter, detect, and interdict illicit trafficking. The decrease reflects a commitment to reduce prior year carryover balances, permitting a lower FY 2017 Budget Request.

Nonproliferation and Arms Control (NPAC)

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, develop programs and strategies to address nonproliferation and arms control challenges and opportunities. The decrease is possible as several projects are complete and others have been delayed; a return to baseline funding following the one-time increase of $3,500,000 by Congress in the FY 2016 budget for improvements in the export control process; and cost-savings in export licensing activities achieved through operational efficiencies.

Defense Nuclear Nonproliferation Research and Development (DNN R&D)

DNN R&D drives the innovation of unilateral and multi-lateral technical capabilities to detect, identify, and characterize: 1) foreign nuclear weapons programs, 2) illicit diversion of special nuclear materials, and 3) nuclear detonations. To meet national and departmental nuclear security requirements, DNN R&D leverages the unique facilities and scientific skills of the Department of Energy, academia, and industry to perform research, including counterterrorism-related R&D, conduct technology demonstrations, and develop prototypes for integration into operational systems. The FY 2017 Budget decrease includes a portion of projected savings resulting from a change in the NNSA strategy regarding the reimbursement of contractor pension funding; a reduction in planned activities for arms control-related R&D; and a return to the baseline Nuclear Detonation Detection (NDD) program after development of a mitigation path for supply chain interruptions.

Nonproliferation Construction

Nonproliferation Construction consolidates construction costs for DNN projects. The goal of the current Nonproliferation Construction program is to construct facilities to dispose of at least 34 metric tons (MT) of surplus U.S. weapon-grade plutonium in accordance with U.S. policy and the amended U.S.-Russia Plutonium Management and Disposition Agreement (PMDA). Currently, the Mixed Oxide (MOX) Fuel Fabrication Facility (MFFF) is the only project in this program and would enable the Department to dispose of weapon-grade plutonium by fabricating it into mixed oxide fuel and irradiating it in commercial nuclear reactors. The Consolidated and Further Continuing Appropriations Act, 2015, directed that construction on the MOX project continue and that cost studies and technology alternative studies be conducted. The National Defense Authorization Act for FY 2015 mandated an independent assessment and validation of the 2014 Plutonium Working Group (PWG) analysis. The Department requested Aerospace Corporation, a federally funded research and development center (FFRDC), was mandated to conduct this assessment. Aerospace Corporation completed two reports documenting its assessment of the April 2014 analysis. Additionally, in June 2015 the Secretary of Energy assembled a Red Team to assess options for the disposition of surplus weapon-grade plutonium. These analyses confirm that the MOX fuel approach will be significantly more expensive than anticipated and will require approximately $800 million to $1 billion annually for decades. As a result, the FY 2017 budget proposes that the MOX project be terminated. The Department will complete pre-conceptual design for the dilute and dispose (D&D) option to establish critical decision-0 (CD-0), Approve Mission Need, and begin conceptual design in late FY 2017.

Nuclear Counterterrorism and Incident Response (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, and incident response capabilities. Finally, NCTIR also executes DOE/NNSA's Emergency Management and Operations Support program that provides policy and implementation of emergency management for all DOE/NNSA offices and sites, and manages the DOE/NNSA Emergency Operations Centers, Emergency Communications Network and Continuity of Operations Plan (COOP) activities. The FY 2017 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.

Successfully achieving nuclear threat reduction within a challenging environment is critical to implementation of the United States' *National Security Strategy*. DNN plays a primary role in implementing U.S. nuclear threat reduction goals within 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, the Department of Defense, the Department of Homeland Security, and the 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.

Nuclear threat reduction is also a key component of the mission of the Department of Energy (DOE) as a whole, as documented in Strategic Objective 6 of the *Strategic Plan of the Department of Energy for 2014-2018.* In carrying out this mission for DOE, 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 DOE, particularly the Office of Nuclear Energy, the Office of Environmental Management, and the Office of Science.

NNSA strengthens nuclear safeguards, export controls, and nonproliferation and arms control regimes to reduce proliferation risks. In 2015, NNSA supported the Secretary of Energy's efforts to develop the Joint Comprehensive Plan of Action (JCPOA) by providing scientific and technical expertise during the negotiation process. Iran's nuclear commitments will be monitored and verified by the International Atomic Energy Agency (IAEA). The technical expertise at the Department of Energy, and particularly NNSA, will provide support for the successful implementation of the JCPOA.

Highlights and Major Changes in the FY 2017 Budget

The DNN FY 2017 Budget Request supports the following key priorities:

- High-priority nuclear and radiological threat reduction efforts, including support for improving partner capabilities to detect and interdict illicit trafficking of nuclear and radiological materials;
- Critical mission support to the IAEA, including strengthening the international nuclear safeguards system and supporting the expanding nuclear security function;
- Funding nonproliferation projects and activities to respond to urgent, emerging threats in unstable regions, particularly the Middle East;
- Advancing satellite payload activities that support treaty monitoring and military missions;
- Addressing critical gaps in classified emergency response communications and equipment recapitalization;
- Sustaining existing stabilization capability for regional incident response in support of the interagency in current cities and roll out one additional city each year;
- Recapitalizing priority nuclear counterterrorism emergency response equipment including neutron multiplicity detectors, specialized search equipment, and contamination monitoring systems;
- Building and sustaining a field deployable emergency response communications network, operating at the highest classification levels, 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;
- Maintaining and strengthening the department's emergency management policies and practices to manage an all-hazards emergency management capability and continue to upgrade the Emergency Communications Network Suite to state of art capabilities;
- Maintaining and strengthening the IAEA's and key international partners' ability to effectively prepare for and respond to a nuclear or radiological incident; and
- Proposes the termination of the MOX approach to plutonium disposition and adopting the dilute and dispose option as the path forward.

Major Outyear Priorities and Assumptions

Outyear funding levels for the Defense Nuclear Nonproliferation appropriation total $8,116,724,000 for FY 2018 through FY 2021, based on the following priorities and assumptions.

Defense Nuclear Nonproliferation Programs

- Reduce the risk of nuclear proliferation and terrorism by minimizing and, when possible, eliminating nuclear materials and ensuring sound management principles for materials that remain.
- Play key roles in the international effort to secure vulnerable nuclear and radiological materials around the world, improve nuclear security implementation, promote nuclear material security best practices, prevent illicit trafficking, and promote long-term risk reduction through promulgation of non-isotopic technologies for radioactive source-based devices and technologies.
- Cooperate with international partners, such as the IAEA, the Global Partnership, INTERPOL, and the Global Initiative to Combat Nuclear Terrorism, and implement an engagement strategy with partner countries that carefully balances threats and indigenous resources.
- Develop approaches, technology, human capital and international infrastructure to strengthen the international nuclear safeguards system and provide the IAEA with necessary resources to implement the evolving nuclear safeguards regime.
- Work with foreign partners at all stages of nuclear development to enhance their ability to meet their safeguards and security obligations.
- Develop U.S. nuclear monitoring capabilities from basic research through field experimentation for nuclear nonproliferation, test monitoring, arms control, and threat reduction, and produce sensors for the nation's space based global nuclear detonation detection capability.
- Support the development of nuclear security centers of excellence that resulted from the 2010, 2012, and 2014 Nuclear Security Summits so they can meet national, regional and international training and capacity-building needs.
- Expand technical engagement and dialogue with China, India, and other countries, and promote international efforts to prevent the proliferation of nuclear expertise.
- Contribute to topical training and curriculum development with international partners to enhance existing programs and in support the Nuclear Security Summit agenda.
- Build and sustain capacity to prevent illicit trafficking in nuclear and radiological materials, including through the deployment of fixed radiation detection capabilities to address remaining gaps in in the Global Nuclear Detection Architecture (GNDA); expanding flexible detection initiatives at strategic airports and for targeted screening of small maritime vessels; supporting nuclear forensics capabilities; and engaging across all relevant communities, including law enforcement and intelligence.
- Facilitate legitimate nuclear cooperation by building domestic and global export control capacity to detect and prevent illicit transfers of WMD-related materials, equipment, and technology by providing technical reviews of U.S. export licenses; conducting technical analyses of interdiction cases; providing technical support to multilateral nonproliferation export control regimes (such as the Nuclear Suppliers Group, the Australia Group, and the Missile Technology Control Regime); and working with foreign partners to strengthen their national systems of export control.

Nuclear Counterterrorism and Incident Response Program

- Maintain and strengthen nuclear/radiological incident response capabilities, the Emergency Operations Center, and the Department's response to all-hazards capabilities to manage accidents and emergencies at all DOE/NNSA headquarters and field sites, sustain existing deployable capabilities, understand and adapt to changes in proliferation and nuclear terrorism threats, and sustain unique modeling and device assessment capabilities.
- Build and sustain classified emergency response communications network for critical real-time operational information sharing.
- Recapitalize emergency response equipment consistent with lifecycle planning to ensure operational readiness is maintained.
- Sustain existing nuclear counterterrorism capabilities in nine cities (Stabilization), and establish the capability in one additional city each year.
- Enhance international nuclear/radiological preparedness and response training programs and support, including implementation of the 2015 Nuclear Threat Reduction (NTR) Work Plan with United Kingdom and France, and sharing of best practices with domestic and foreign partners to reduce terrorism risks to nuclear material and facilities.

- Develop and implement policy, technical approaches, capacity-building and engagements to strengthen: 1) domestic and international radiological/nuclear counterterrorism capabilities; 2) foreign nuclear/radiological incident preparedness and response capabilities; and 3) U.S. government nuclear counterproliferation objectives.

DOE Working Capital Fund (WCF) Support

The NNSA Defense Nuclear Nonproliferation appropriation projected contribution to the DOE Working Capital Fund for FY 2017 is $5,769,000. This funding covers certain shared enterprise activities including managing enterprise-wide systems and data, telecommunications and supporting the integrated acquisition environment.

Legacy Contractor Pensions

NNSA requests $331,700,000 in FY 2017 for Legacy Contractor Pensions split between Weapons Activities and Defense Nuclear Nonproliferation, $46,804,000 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 the contracts. 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 2017 by $56,000,000 million which is covered in the Request.

Entry Level Hires

NNSA supports a variety of programs to help train and potentially 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 the Minority Serving Institutions Partnership Program (MSIPP). 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 2017, the DNN appropriation will provide up to $2,800,000 for NGFP support and development activities.

Defense Nuclear Nonproliferation
Funding by Congressional Control
(Non-Comparable)

	FY 2015 Enacted	FY 2015 Current	FY 2016 Enacted	FY 2017 Request	FY 2017 vs FY 2016
Defense Nuclear Nonproliferation Appropriation					
Defense Nuclear Nonproliferation					
Material Management and Minimization					
Material Management and Minimization	0	0	0	341,094	+341,094
HEU Reactor Conversion	0	0	115,000	0	-115,000
Nuclear Material Removal	0	0	115,000	0	-115,000
Material Disposition	0	0	86,584	0	-86,584
Total, Material Management and Minimization	**0**	**0**	**316,584**	**341,094**	**+24,510**
Global Material Security					
Global Material Security	0	0	0	337,108	+337,108
International Nuclear Security	0	0	130,527	0	-130,527
Radiological Security	0	0	153,749	0	-153,749
Nuclear Smuggling Detection	0	0	142,475	0	-142,475
Total, Global Material Security	**0**	**0**	**426,751**	**337,108**	**-89,643**
Nonproliferation and Arms Control	**0**	**0**	**130,203**	**124,703**	**-5,500**
Defense Nuclear Nonproliferation R&D	**393,401**	**386,308**	**419,333**	**393,922**	**-25,411**
Nonproliferation Construction					
99-D-143 Mixed Oxide (MOX) Fuel Fabrication Facility, SRS	**0**	**0**	**340,000**	**270,000**	**-70,000**
Total, Nonproliferation Construction	**0**	**0**	**340,000**	**270,000**	**-70,000**
Global Threat Reduction Initiative					
Highly Enriched Uranium (HEU) Reactor Conversion	**119,383**	**119,383**	**0**	**0**	**0**
International Nuclear and Radiological Material Removal and Protection	**117,737**	**120,337**	**0**	**0**	**0**
Domestic Radiological Material Removal and Protection	**88,632**	**88,632**	**0**	**0**	**0**
International Contributions	**0**	**2,200**	**0**	**0**	**0**
Total, Global Threat Reduction Initiative	**325,752**	**330,552**	**0**	**0**	**0**
Nonproliferation and International Security	**141,359**	**141,359**	**0**	**0**	**0**
International Material Protection and Cooperation	**270,911**	**270,607**	**0**	**0**	**0**
Fissile Materials Disposition (FMD)					
U.S. Surplus FMD (Operations and Maintenance)					
U.S. Plutonium Disposition	**60,000**	**60,000**	**0**	**0**	**0**
U.S. Uranium Disposition	**25,000**	**35,000**	**0**	**0**	**0**
Subtotal, U.S. Surplus FMD Operations and Maintenance	**85,000**	**95,000**	**0**	**0**	**0**
Construction	**345,000**	**345,000**	**0**	**0**	**0**
Total, U.S. Surplus Fissile Materials Disposition	**430,000**	**440,000**	**0**	**0**	**0**
Total, Fissile Materials Disposition	**430,000**	**440,000**	**0**	**0**	**0**
Total, Defense Nuclear Nonproliferation Programs	**1,561,423**	**1,568,826**	**1,632,871**	**1,466,827**	**-166,044**
Nuclear Counterterrorism Incident Response Program	**0**	**0**	**234,390**	**271,881**	**+37,491**
Legacy Contractor Pensions	**102,909**	**102,909**	**94,617**	**83,208**	**-11,409**
Subtotal, Defense Nuclear Nonproliferation Appropriation	**1,664,332**	**1,671,735**	**1,961,878**	**1,821,916**	**-139,962**
Use of Prior Year Balances	**-22,963**	**-32,963**	**-21,576**	**0**	**+21,576**
Recission of Prior Year Balances	**-26,121**	**-26,121**	**0**	**-14,000**	**-14,000**
Total, Defense Nuclear Nonproliferation Appropriation	**1,615,248**	**1,612,651**	**1,940,302**	**1,807,916**	**-132,386**

The Use of Prior Year Balances for FY 2016 includes $21,576,000 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 2015 Transferred: SBIR: $6,233; STTR: $860
- FY 2016 Projected: SBIR: $6,784; STTR: $1,018
- FY 2017 Projected: SBIR: $6,832; STTR: $961

Defense Nuclear Nonproliferation
Funding by Congressional Control
(Comparable)

(Dollars in Thousands)

	FY 2015 Enacted	FY 2015 Current	FY 2016 Enacted	FY 2017 Request	FY 2017 vs FY 2016
Defense Nuclear Nonproliferation Appropriation					
Defense Nuclear Nonproliferation					
Material Management and Minimization					
Material Management and Minimization	0	0	0	341,094	+341,094
HEU Reactor Conversion	119,383	119,383	115,000	0	-115,000
Nuclear Material Removal	68,536	68,536	115,000	0	-115,000
Material Disposition	85,000	95,000	86,584	0	-86,584
Total, Material Management and Minimization	**272,919**	**282,919**	**316,584**	**341,094**	**+24,510**
Global Material Security					
Global Material Security	0	0	0	337,108	+337,108
International Nuclear Security	134,875	134,875	130,527	0	-130,527
Radiological Security	137,833	137,833	153,749	0	-153,749
Nuclear Smuggling Detection	151,536	151,536	142,475	0	-142,475
International Contributions	0	4,496	0	0	0
Total, Global Material Security	**424,244**	**428,740**	**426,751**	**337,108**	**-89,643**
Nonproliferation and Arms Control	**125,859**	**125,859**	**130,203**	**124,703**	**-5,500**
Defense Nuclear Nonproliferation R&D	**393,401**	**386,308**	**419,333**	**393,922**	**-25,411**
Nonproliferation Construction					
99-D-143 Mixed Oxide (MOX) Fuel Fabrication Facility, SRS	345,000	345,000	340,000	270,000	-70,000
Total, Nonproliferation Construction	**345,000**	**345,000**	**340,000**	**270,000**	**-70,000**
Nuclear Counterterrorism Incident Response Program	**224,033**	**224,033**	**234,390**	**271,881**	**+37,491**
Legacy Contractor Pensions	**102,909**	**102,909**	**94,617**	**83,208**	**-11,409**
Subtotal, Defense Nuclear Nonproliferation Appropriation	**1,888,365**	**1,895,768**	**1,961,878**	**1,821,916**	**-139,962**
Use of Prior Year Balances	**-22,963**	**-32,963**	**-21,576**	**0**	**+21,576**
Recission of Prior Year Balances	**-26,121**	**-26,121**	**0**	**-14,000**	**-14,000**
Total, Defense Nuclear Nonproliferation Appropriation	**1,839,281**	**1,836,684**	**1,940,302**	**1,807,916**	**-132,386**

Outyears for Defense Nuclear Nonproliferation

(Dollars in Thousands)

	FY 2018 Request	FY 2019 Request	FY 2020 Request	FY 2021 Request
Defense Nuclear Nonproliferation				
Material Management and Minimization	**424,195**	**419,200**	**436,007**	**447,261**
Global Material Security	**409,132**	**434,420**	**446,245**	**537,101**
Nonproliferation and Arms Control	**137,681**	**140,099**	**142,867**	**145,545**
Defense Nuclear Nonproliferation R&D	**476,677**	**486,517**	**492,123**	**496,367**
Nonproliferation Construction				
99-D-143 Mixed Oxide (MOX) Fuel Fabrication Facility, SRS	**221,000**	**221,000**	**221,000**	**221,000**
Total, Nonproliferation Construction	**221,000**	**221,000**	**221,000**	**221,000**
Total, Defense Nuclear Nonproliferation Programs	**1,668,685**	**1,701,236**	**1,738,242**	**1,847,274**
Nuclear Counterterrorism Incident Response Program	**253,024**	**252,260**	**257,653**	**257,822**
Legacy Contractor Pensions	**52,640**	**29,296**	**29,296**	**29,296**
Subtotal, Defense Nuclear Nonproliferation Appropriation	**1,974,349**	**1,982,792**	**2,025,191**	**2,134,392**
Use of Prior Year Balances	**0**	**0**	**0**	**0**
Recission of Prior Year Balances	**0**	**0**	**0**	**0**
Total, Defense Nuclear Nonproliferation Appropriation	**1,974,349**	**1,982,792**	**2,025,191**	**2,134,392**

SBIR/STTR:

- FY 2018 Request: SBIR: $8,290; STTR: $1,166
- FY 2019 Request: SBIR: $8,454; STTR: $1,189
- FY 2020 Request: SBIR: $8,657; STTR: $1,217
- FY 2021 Request: SBIR: $8,742; STTR: $1,229

Defense Nuclear Nonproliferation
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 2015 Enacted	FY 2015 Current	FY 2016 Enacted	FY 2017 Request	FY 2017 vs FY 2016
Research and Development (R&D)					
Basic	87,205	87,205	60,230	59,351	-879
Applied	148,311	148,311	162,913	160,533	-2,380
Development	47,803	47,803	53,020	52,246	-774
Subtotal, R&D	**283,319**	**283,319**	**276,163**	**272,130**	**-4,033**
Equipment	0	0	0	0	0
Construction	0	0	0	0	0
Total, R&D	**283,319**	**283,319**	**276,163**	**272,130**	**-4,033**

Material Management and Minimization

Overview

DNN's Request supports national security priorities articulated in the National Security Strategy of the United States and the Nuclear Posture Review, both of which are reflected in the Department of Energy Strategic Plan. These priorities include efforts to secure or eliminate the world's most vulnerable nuclear weapon materials; dispose of excess nuclear weapon and radiological materials in the United States; support the development of new technologies for nonproliferation; promote the secure expansion of nuclear energy; and improve capabilities worldwide to deter and detect the illicit movement of nuclear materials.

The FY 2017 Material Management and Minimization (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 meeting the DOE strategic goal for "Nuclear Security" and plays a critical role in meeting Strategic Objective 6 to reduce global nuclear security threats. The M^3 program also supports the "Nuclear Threat Reduction" pillar described in the NNSA Enterprise Strategic Vision and is a key component of the integrated nonproliferation, counterterrorism, and emergency response strategies described in NNSA's report, *Prevent, Counter, and Respond—A Strategic Plan to Reduce Global Nuclear Threats (FY 2016-FY 2020)* (NPCR report). M^3 makes these strategic contributions through highly enriched uranium (HEU) and plutonium disposition, the 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 2017 Budget Request

- The Conversion subprogram will continue the pursuit of reactor conversions/shutdowns during the FY 2017 - FY 2021 time frame. Five facilities will be converted or verified as shutdown in FY 2017.
- 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 Convert and Remove subprograms will support the implementation of the Joint Comprehensive Plan of Action (JCPOA) to address Iran's nuclear program through conversion of the Arak Reactor and nuclear material removals.
- The Nuclear Material Removal subprogram will continue to identify and eliminate excess HEU and plutonium, including removing and/or disposing of 230 kilograms of material from Kazakhstan, Ghana, Canada, Europe, and possibly Nigeria.
- The Material Disposition subprogram will continue to support the Administration's commitment to plutonium disposition and to the U.S.-Russia Plutonium Management and Disposition Agreement (PMDA) and carry out plutonium management discussions with non-Russian partners.
- 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.

Major Outyear Priorities and Assumptions

Outyear funding levels for the M^3 program total $1,726,663,000 for FY 2018 through FY 2021. The program plays a key role in supporting the goal of enhancing and implementing nuclear security commitments made by the United States and our international partners at forums such as the Nuclear Security Summits. M^3 is currently working in over 25 countries around the world to implement nuclear material minimization strategies in line with this goal. By the end of FY 2021, the M^3 program will have converted or verified the shutdown of 120 of the 156 HEU research reactors and isotope production facilities within M^3's program scope, removed approximately 6,800 kilograms of excess weapons-useable nuclear materials, and eliminated 166 MT surplus HEU by down-blending or direct disposal. In addition, M^3 will continue to work with the Russians and the International Atomic Energy Agency (IAEA) to ensure that surplus U.S. and Russian plutonium is disposed of in accordance with the amended U.S.-Russia PMDA.

Material Management and Minimization
Funding
(Non-Comparable)

(Dollars in Thousands)

	FY 2015 Enacted	FY 2015 Current	FY 2016 Enacted	FY 2017 Request	FY 2017 vs FY 2016
Material Management and Minimization					
HEU Reactor Conversion	0	0	115,000	128,359	+13,359
Nuclear Material Removal	0	0	115,000	68,902	-46,098
Material Disposition	0	0	86,584	143,833	+57,249
Total, Material Management and Minimization	**0**	**0**	**316,584**	**341,094**	**+24,510**

Material Management and Minimization
Funding
(Comparable)

(Dollars in Thousands)

	FY 2015 Enacted	FY 2015 Current	FY 2016 Enacted	FY 2017 Request	FY 2017 vs FY 2016
Material Management and Minimization					
HEU Reactor Conversion	119,383	119,383	115,000	128,359	+13,359
Nuclear Material Removal	68,536	68,536	115,000	68,902	-46,098
Material Disposition	85,000	95,000	86,584	143,833	+57,249
Total, Material Management and Minimization	**272,919**	**282,919**	**316,584**	**341,094**	**+24,510**

Outyears for Material Management and Minimization
Funding

(Dollars in Thousands)

	FY 2018 Request	FY 2019 Request	FY 2020 Request	FY 2021 Request
Material Management and Minimization				
HEU Reactor Conversion	156,380	157,226	157,991	159,029
Nuclear Material Removal	128,758	122,767	138,642	148,820
Material Disposition	139,057	139,207	139,374	139,412
Total, Material Management and Minimization	**424,195**	**419,200**	**436,007**	**447,261**

Material Management and Minimization
Explanation of Major Changes
(Dollars in Thousands)

	FY 2017 vs FY 2016
Material Management and Minimization	
Conversion: The increase in funding reflects additional scope of work in three areas. The first area is support for reactor conversion, where additional funding will be used for key procurement necessary to accelerate reactor conversions in Kazakhstan and in the United States. The second area is to fully fund cooperative agreements to support the establishment of a reliable, domestic, non-HEU-based production capability for Mo-99. The third area is support for the implementation of the Uranium Lease and Take Back (ULTB) Program.	+13,359
Nuclear Material Removal: The decrease in funding reflects a reduced scope of work in FY 2017, following the completion of several major initiatives in time for the 2016 Nuclear Security Summit, including completion of the removal of all HEU and plutonium from Japan's Fast Critical Assembly. In addition, the Request assumes the use of prior-year uncosted balances in FY 2017 to continue Russian-origin and Gap removal projects.	-46,098
Material Disposition: The increase is primarily attributed to the depletion of prior-year uncosted balances in the U.S. plutonium disposition program. The requested new budget authority is consistent with the minimal level of effort for plutonium disposition since FY 2013 when the Department began assessing options for plutonium disposition. The increase will also support the accelerated pace for disposal of legacy HEU material at Y-12 in order to reduce risk. In addition, the increase supports the initiation of the critical decision process associated with the adoption of the dilute and dispose program.	+57,249
Total, Material Management and Minimization	**+24,510**

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 molybdenum-99 (Mo-99) producers to convert their existing operations to use LEU targets and accelerate the development of new non-HEU-based Mo-99 production capabilities in the United States.

The Convert subprogram will continue to support the Joint Comprehensive Plan of Action (JCPOA) by facilitating timely progress toward final design of Iran's Arak reactor. The Convert subprogram will have 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. Specifically, the program will continue its work to develop a high-density LEU fuel and fabrication capability necessary to convert 6 U.S. high performance research reactors from HEU to LEU fuel. The high performance research reactors cannot convert with existing LEU fuels, and require larger amounts of HEU to operate than standard research reactors. FYNSP funding will support work such as critical experiments that will allow for the selection of a fuel fabrication process, and the preparation of a base fuel qualification report for submission to the Nuclear Regulatory Commission.

The Convert subprogram will continue its work to support the full conversion of international Mo-99 production facilities from the use of HEU targets to LEU targets, and continue to provide support to accelerate the establishment of new, non-HEU-based Mo-99 production facilities in the United States. The major international Mo-99 producers have been developing LEU target technology and processing capabilities, and FY 2017 funding will be essential to ensuring the international Mo-99 producers complete their conversions on schedule. 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, and funding in FY 2017 will be crucial for fully funding the NNSA contribution to the projects and maintaining schedules to develop and expand Mo-99 production in the United States during a time when the world's largest producer, located in Canada, is no longer expected to produce this important medical isotope. Canada has announced that it will cease regular production of Mo-99 in October 2016.

The Convert subprogram will continue the Uranium Lease and Take-Back (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 its use by the commercial entities. Direct costs associated with the production, analysis, packaging and consumption of the LEU leased under the ULTB program, will be paid by ULTB customers on an annual basis. M^3 authorization to expend the ULTB payments received from domestic commercial entities for leasing the uranium will require annual congressional authorization and appropriation.

Convert work in Russia will be limited to technical exchanges on the pilot reactors agreed to in the original scope of the 2010 Agreement between DOE and Rosatom, with funding only to support U.S. national laboratory participation in these exchanges. As a result of the moratorium on new work in Russia, the Convert subprogram has re-evaluated the Russian facilities in its program scope and reduced the overall program scope from 197 to 156 HEU facilities.

FY 2018 – FY 2021 Key Milestones

- (Jan 2018) Establish additional non-HEU based Mo-99 production capabilities in the United States.
- (Dec 2018) Complete the conversion of all international Mo-99 producers to LEU-based production.
- (Sep 2021) Complete conversion or verify shutdown of an additional 12 research reactors and 5 isotope production facilities for a total of 120.
- (Sep 2021) Continue ongoing work with any commercial entity eligible to use the ULTB program.

Activities and Explanation of Changes

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs. FY 2016
Conversion $115,000,000	**Conversion $128,359,000**	**Conversion +$13,359,000**
• Convert an additional four reactors and isotope production facilities in FY 2016 for a total of 98 including China's Miniature Neutron Source Reactor (MNSR). • Provide technical and financial support to the U.S. private sector to accelerate the 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. • Establish a Uranium Lease and Take-Back (ULTB) program.	• Convert an additional five reactors and isotope production facilities for a total of 103 facilities converted. • Provide technical and financial support to the U.S. private sector to accelerate the 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 to implement the ULTB program. **FY 2018-FY 2021** • Complete conversion or verify shutdown of an additional 12 research reactors and 5 isotope production facilities for a total of 120 converted by the end of FY 2021. • Establish additional non-HEU based Mo-99 production capabilities in the United States. • Continue ongoing work with any commercial entity eligible to utilize the ULTB program.	• The increased funding reflects increased scope of work in three areas. The first area is support for reactor conversion, where additional funding will be used for key procurements necessary to accelerate reactor conversions in Kazakhstan and the United States. The second area is to fully fund cooperative agreements to support the establishment of a reliable, domestic, non-HEU-based production capability for Mo-99, a critical medical radioisotope used in over 50,000 diagnostic procedures daily in the United States. This will be especially critical as the market enters a period of supply uncertainty following the cessation of Canadian Mo-99 production in October 2016. The third area is support for the implementation of the Uranium Lease and Take Back (ULTB) Program, where additional funding will be used to cover indirect costs for U.S. laboratory and contractor support to negotiate and execute ULTB contracts and to conduct material analysis and planning.

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 or curie of this dangerous material that is removed reduces the risk of a terrorist acquiring the material for use in a nuclear weapon.

This activity 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 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 nuclear material to identify candidates for removal or disposition. The Remove subprogram looks at material characteristics and facility security to ensure that any material covered under the program is a nonproliferation risk.

The subprogram works with foreign partners to characterize, stabilize, package, and transport nuclear materials through direct technical assistance and training of facility personnel. The Remove subprogram supports foreign partners as they obtain the required certifications and permits for packaging and transport by assisting with the technical and analytical support. When fresh HEU is removed from a facility in other than a high income economy country, the Remove subprogram may provide replacement LEU, or other incentives, so that a facility can continue to operate its reactor without the financial loss of giving up its HEU. The subprogram will also purchase any equipment necessary for the removal.

The Remove subprogram thoroughly evaluates the technical, political, environmental, legal and financial issues before removing nuclear material from other countries, and projects with high income countries are always implemented with extensive cost-sharing. In most high income country removals the subprogram only supports costs related to labor and travel for U.S. national laboratory experts, who provide technical expertise to help ensure that the material is properly characterized, stabilized, and packaged for transport. These costs are limited to between 5% and 20% of the total project cost. The high income country is responsible for all other costs, including the packaging, transportation, and acceptance fees (80%-95% of total project costs).

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 plans to conduct a mock deployment to test its capability to address emerging threats in the third quarter in FY 2017.

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 project will likely exceed the $3,000,000 threshold:

1. Japan's Fast Critical Assembly (FCA) - President Obama and Japan Prime Minister Abe have committed to completing the removal of all highly enriched uranium (HEU) and plutonium from FCA in 2016. During FY 2016 and FY 2017, pre-conceptual design will be performed and completed to support a CD-0 Mission Need in FY 2017 at the Savannah River Site (SRS) for a capability to prepare the plutonium for disposition. Funding for the conceptual design is being requested under the Material Management and Minimization Program. Japan will contribute funds for this effort.

The line item supporting this capability, which will be requested under the Nonproliferation Construction program, is projected for FY 2018 with CD-1 in mid to late FY 2018. This capability could also potentially be used to oxidize surplus U.S. plutonium for ultimate disposition. This project will include installation of a new inert glovebox at SRS and may require dismantlement and removal of equipment in existing rooms, establishment of walls to segregate contamination areas from radiological buffer areas, installation of ventilation and fire systems, material control and accountability equipment, furnace, criticality alarms, and security equipment. The cost for conceptual design is expected to be between $3 million to $5 million, exceeding the threshold for conceptual design. Therefore, this budget submittal also serves as the notification for the expected cost for conceptual design.

FY 2018-FY 2021 Key Milestones

- (Sep 2018) Seek CD-1 approval to begin Preliminary Design for the FCA line item project.
- (Sep 2021) Remove or confirm disposition of 515 additional kilograms of vulnerable nuclear material for a cumulative total of approximately 6,800 kg. This includes material from Canada, Europe, Japan, and Kazakhstan.
- (Sep 2021) Continue 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.

Activities and Explanation of Changes (Comparable)

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs. FY 2016
Nuclear Material Removal $115,000,000	**Nuclear Material Removal $68,902,000**	**Nuclear Material Removal -$46,098,000**
• Remove and/or confirm the disposition of an additional 679 kilograms of HEU and plutonium from countries such as Argentina, Indonesia, Japan, Kazakhstan, Poland, Canada, and Ghana as well as from our partners in Europe, for a cumulative total of 6,055 kilograms. • Consolidate to fewer locations material that cannot be removed or disposed. • Continue 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 230 kilograms of HEU and plutonium from countries such Kazakhstan, Ghana, Canada, Europe, and possibly Nigeria for a cumulative total of 6,285 kilograms. • Continue conceptual design for CD-0 Mission Need for the FCA. • Conduct Emerging Threats mock deployment to test its capability to address emerging threats. • Support the implementation of the Joint Comprehensive Plan of Action (JCPOA) with Iran. **FY 2018-FY 2021** • By the end of FY 2018, seek CD-1 approval to begin Preliminary Design for the Japan FCA line item project • By the end of FY 2021, remove and/or confirm disposition of 515 additional kilograms of vulnerable nuclear material for a cumulative total of approximately 6,800 kg. • Continue 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.	• The decrease in funding reflects a reduced scope of work in FY 2017, following the completion of several major initiatives in time for the 2016 Nuclear Security Summit, including completion of the removal of all HEU and plutonium from Japan's Fast Critical Assembly. In addition, the new budget authority assumes the use of prior-year uncosted balances in FY 2017 to continue Russian-origin and Gap removal projects.

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 highly enriched uranium (HEU) in the United States, working with Russia to dispose of Russian surplus weapon-grade plutonium under the U.S.-Russia Plutonium Management and Disposition Agreement (PMDA), directing the international plutonium management initiative, 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 Los Alamos National Laboratory (LANL); conversion of other plutonium to oxide at H-Canyon/HB-Line at Savannah River; and storage of surplus pits at Pantex.

The Consolidated and Further Continuing Appropriations Act, 2015, directed that construction on the Mixed Oxide Fuel Fabrication Facility (MFFF) project continue and that cost studies and technology alternative studies be conducted. The National Defense Authorization Act for FY 2015 mandated an independent assessment and validation of the 2014 Plutonium Working Group (PWG) analysis and the Department requested Aerospace Corporation, a federally funded research and development center (FFRDC), conduct this assessment. Aerospace Corporation completed two reports documenting its assessment of the April 2014 analysis. Additionally, in June 2015 the Secretary of Energy assembled a Red Team to assess options for the disposition of surplus weapon-grade plutonium. These analyses confirm that the MOX fuel approach will be significantly more expensive than anticipated and will require approximately $800 million to $1 billion annually for decades. As a result, beginning in FY 2017 the MFFF project will be terminated.

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 project will likely exceed the $3,000,000 threshold:

1. Dilute and dispose (D&D) program - During FY 2016 and FY2017, pre-conceptual design will be performed and completed to support a CD-0 Mission Need in FY 2018 at the Savannah River Site for the D&D program. The D&D option will disposition surplus U.S. weapon-grade plutonium by diluting it and disposing of it at a geologic repository.

The Department will complete pre-conceptual design for the D&D option to establish critical decision (CD), define mission need, and begin conceptual design in late FY 2017. The cost for conceptual design is expected to be between $3 million to $5 million, exceeding the threshold for conceptual design. Therefore, this budget submittal also serves as notification for the expected cost for conceptual design. The D&D option will disposition surplus U.S. weapon-grade plutonium by diluting it and disposing of it at a geologic repository.

In FY 2017, the Dispose program will continue a detailed lifecycle baseline for the dilute and dispose program that includes storage of surplus pits at Pantex, pit disassembly and oxide conversion at LANL, oxide conversion at SRS, dilution and disposal of the plutonium, transportation, all projects at the various sites to execute the program, and any other supporting costs required for the program baseline. The lifecycle baseline will be independently validated and approved in FY 2018. Also in FY 2017, the Department will perform studies to optimize the final waste form including optimizing container loading and material configuration at the repository. Furthermore, the Department will conduct the environmental analyses and potential legislative changes to enable the disposition of this plutonium at an appropriate facility.

Over the past decade, NNSA has eliminated more than 150 metric tons (MT) of weapons-usable HEU by down-blending it to low enriched uranium (LEU) or shipped for down-blending for use in power and research reactors in the United States and abroad. The program has substantially reduced holdings of fissile materials throughout the Department of Energy complex,

rid the world of 6,000 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. 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.

In the near term, the Dispose subprogram will 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 in which the material is stored. The inventory is a result of the 1994 Surplus Declaration and consists of 340 items. The largest quantity of remaining materials includes 184 source items of dilute and concentrated uranyl nitrate solutions. Y-12 operations indicate that 75 drums of this uranyl nitrate solution could be discarded from building 9206 per year. At that pace, the entire population of these safe bottles would be diluted as necessary and shipped by the end of FY 2020.

In addition, the program will focus on the development of international plutonium management strategies with countries other than Russia, by developing bi-lateral and multi-lateral working arrangements in which countries 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.

The program is also responsible for managing enriched uranium supply and demand needs and commitments in support of Defense Nuclear Nonproliferation 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 reactor, 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.

FY 2018-FY 2021 Key Milestones

- (Sep 2018) Complete Conceptual Design and seek CD-1 approval for D&D Program.
- (Sep 2018) Complete Lifecycle Cost Estimate including independent validation for the D&D Program.
- (Sep 2020) Complete legacy material disposal in Building 9206 to reduce risk.
- (Sep 2021) At the Savannah River Site, convert 2,415 cumulative kg of plutonium into oxide for eventual disposition.
- (Sep 2021) At Los Alamos National Laboratory, convert 1,167 cumulative kg of plutonium into oxide for eventual disposition.
- (Sep 2021) Down-blend or ship for down-blending a cumulative total of 166 metric tons of HEU.

Activities and Explanation of Changes (Comparable)

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs. FY 2016
Material Disposition $86,584,000	**Material Disposition $143,833,000**	**Material Disposition +$57,249,000**
U.S. Plutonium Disposition $54,504,000	**U.S. Plutonium Disposition $107,833,000**	**U.S. Plutonium Disposition +$53,329,000**
• Maintain capability to disassemble nuclear weapons pits and convert them into plutonium oxide for eventual disposition. The conversion uses the LANL ARIES process and is part of the 2 MT campaign. • Continue oxide production for eventual disposition at the SRS H-Canyon facility. • Continue to provide storage, surveillance, and packaging capabilities for surplus pits and plutonium at Pantex. • Begin pre-conceptual design, lifecycle baseline development and National Environmental Policy Act (NEPA) process for the dilute and dispose Program. • Maintain the Waste Solidification Building (WSB) facility in a lay-up configuration. • 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 site roads, bridges, barricades, and utility distribution systems.	• Disassemble nuclear weapons pits and convert them into plutonium oxide for eventual disposition. The conversion uses the LANL ARIES process and is part of the 2 MT campaign. • Convert plutonium into oxide for eventual disposition at the SRS H-Canyon facility. • Continue to provide storage, surveillance, and packaging capabilities for surplus pits and plutonium at Pantex. • Complete pre-conceptual design package on the future dilute and dispose line item project for surplus plutonium and approve CD-0. • Continue preparation of the lifecycle baseline for the dilute and dispose program for surplus plutonium disposition. • Continue NEPA process for the dilute and dispose program. • Maintain the WSB facility in a lay-up configuration while the Department determines options for future use.	• The increase in funding reflects (1) the depletion of prior-year uncosted balances; and (2) initiation of the critical decision process associated with the adoption of the dilute and dispose program.

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs. FY 2016
	• 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 site roads, bridges, barricades, and utility distribution systems. **FY 2018-FY 2021** • Scope and costs will be refined in subsequent budget submissions to reflect the funding profile and work scope associated with the dilute and dispose option for plutonium disposition**.**	
U.S. Uranium Disposition $31,080,000 • Down-blend or ship for down-blending of 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. • Support tracking and analyzing enriched uranium supply and demand needs and commitments of Defense Nuclear Nonproliferation mission goals.	**U.S. Uranium Disposition $35,000,000** • 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 Building 9206 to reduce risk. • Support tracking and analyzing enriched uranium supply and demand needs and commitments of Defense Nuclear Nonproliferation mission goals.	**U.S. Uranium Disposition +$3,920,000** • The increase will support the accelerated pace for disposal of legacy HEU material at Y-12 in order to reduce risk.

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs. FY 2016
	FY 2018-FY 2021 • Continue to down-blend surplus HEU in order to meet nonproliferation objectives. • Continue contractor management oversight of the stored LEU inventory.	
International Plutonium Disposition $1,000,000	**International Plutonium Disposition $1,000,000**	**International Plutonium Disposition $0**
• Implement plutonium management strategies with international partners.	• Implement plutonium management strategies with international partners other than Russia. **FY 2018-FY 2021** • Scope and costs will be refined in subsequent budget submissions to reflect the funding profile associated with the final plutonium disposition strategy.	• No Change

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 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021
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	94 facilities	98 facilities	103 facilities	108 facilities	113 facilities	116 facilities	120 facilities
Result	94						
Endpoint Target	By 2035, convert or verify the shutdown prior to conversion of 156 HEU reactors and isotope production facilities.						
Nuclear Material Removed – Cumulative number of kilograms of vulnerable nuclear material (HEU and plutonium) removed or disposed.							
Target	5,332 kg	6,055 kg	6,285 kg	6,499 kg	6,594 kg	6,629 kg	6,800 kg
Result	5,376						
Endpoint Target	By 2022, remove or dispose of 7,000 kilograms of vulnerable nuclear material (HEU and plutonium), enough for approximately 280 nuclear bombs.						
U.S. Highly Enriched Uranium (HEU) Down-blended - Cumulative amount of surplus U.S. highly enriched uranium (HEU) down-blended or shipped for down-blending.							
Target	150 MT	153 MT	156 MT	159 MT	162 MT	165 MT	166 MT
Result	150						
Endpoint Target	By the end of FY 2030, complete disposition of 186 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, disposition paths for weapons containing HEU, etc.						
U.S. Plutonium Disposition (LANL) - Cumulative kilograms of plutonium metal converted to oxide at Los Alamos National Laboratory.							
Target	792 kg	667 kg	767 kg	867 kg	967 kg	1,067 kg	1,167 kg
Result	667						
Endpoint Target	By FY 2029, complete operations for 2 MT (2000 kg) of plutonium converted to oxide.						
U.S. Plutonium Disposition (H-Canyon) - Cumulative kilograms (kg) of plutonium converted to oxide at SR H-Canyon.							
Target	100 kg	100 kg	350 kg	800 kg	1,275 kg	1,825 kg	2,415 kg
Result	1.8						
Endpoint Target	By the end of FY 2023, complete operations for 3.7 MT of plutonium converted to oxide at Savannah River Site.						

Material Management and Minimization
Capital Summary

(Dollars in Thousands)

	Total	Prior Years	FY 2015 Enacted	FY 2015 Current	FY 2016 Enacted	FY 2017 Request	FY 2017 vs FY 2016 Request
Capital Operating Expenses Summary (including (Major Items of Equipment (MIE)							
Capital Equipment >$500K (including MIE)	N/A	N/A	11,007	11,007	10,514	10,699	+185
Plant Projects (GPP) (<$10M)	N/A	N/A	4,001	4,001	4,089	4,179	+90
Total, Capital Operating Expenses	**0**	**0**	**15,008**	**15,008**	**14,603**	**14,878**	**+275**
Capital Equipment > $500K (including MIE)							
Total Non-MIE Capital Equipment (>$500K)	N/A	N/A	8,226	8,226	8,407	8,592	+185
ARIES Pit Cutter	6,995	0	2,781	2,781	2,107	2,107	0
Total, Capital Equipment (including MIE)	**6,995**	**0**	**11,007**	**11,007**	**10,514**	**10,699**	**+185**
Plant Projects (GPP and IGPP) (Total Estimated Cost (TEC) <$10M)							
Total Plant Projects (GPP) (Total Estimated Cost (TEC) <$5M)	N/A	N/A	4,001	4,001	4,089	4,179	+90
Total, Plant Projects (GPP) (Total Estimated Cost (TEC) <$10M)	**0**	**0**	**4,001**	**4,001**	**4,089**	**4,179**	**+90**
Total, Capital Summary	**6,995**	**0**	**15,008**	**15,008**	**14,603**	**14,878**	**+275**

Outyears for Material Management and Minimization

(Dollars in Thousands)

	FY 2018 Request	FY 2019 Request	FY 2020 Request	FY 2021 Request
Capital Operating Expenses Summary (including (Major Items of Equipment (MIE)				
Capital Equipment >$500K (including MIE)	8,781	8,974	9,171	9,373
Plant Projects (GPP) (<$10M)	4,271	4,365	4,461	4,559
Total, Capital Operating Expenses	**13,052**	**13,339**	**13,632**	**13,932**
Capital Equipment > $500K (including MIE)				
Total Non-MIE Capital Equipment (>$500K)	8,781	8,974	9,171	9,373
ARIES Pit Cutter	0	0	0	0
Total, Capital Equipment (including MIE)	**8,781**	**8,974**	**9,171**	**9,373**
Plant Projects (GPP) (Total Estimated Cost (TEC) <$10M)				
Total Plant Projects (GPP) (Total Estimated Cost (TEC) <$5M)	4,271	4,365	4,461	4,559
Total, Plant Projects (GPP) (Total Estimated Cost (TEC) <$10M)	**4,271**	**4,365**	**4,461**	**4,559**
Total, Capital Summary	**13,052**	**13,339**	**13,632**	**13,932**

Global Material Security

Overview

The Global Material Security (GMS) FY 2017 Budget Request highlights the critical importance of a multilayered approach to prevent the most vulnerable nuclear material and highest activity radiological material from falling into the wrong hands. GMS works with partner countries to increase the security of vulnerable stockpiles of nuclear weapons, weapons-usable nuclear materials, and radiological materials and to improve partner countries' abilities to deter, detect, interdict and investigate illicit trafficking. This request supports national security priorities articulated in the National Security Strategy of the United States and the Nuclear Posture Review, both of which are reflected in the Department of Energy (DOE) Strategic Plan. The GMS program directly contributes to meeting the DOE Strategic Plan goal for "Nuclear Security" by playing a critical role in meeting DOE's Strategic Objective 6 to reduce global nuclear security threats. The GMS program also supports the "Nuclear Threat Reduction" pillar described in the NNSA Enterprise Strategic Vision, and is a key component of the integrated nonproliferation, counterterrorism, and emergency response strategies described in NNSA's report, *Prevent, Counter, and Respond—A Strategic Plan to Reduce Global Nuclear Threats (FY 2016-FY 2020)* (NPCR report).

GMS consists of three subprograms: International Nuclear Security, Radiological Security, and Nuclear Smuggling Detection and Deterrence.

In the long term, each partner country must be able to sustain its ability to secure, reduce, and interdict nuclear and radioactive materials. Therefore, all GMS subprograms incorporate support to enhance areas critical to long-term successful operation of the technologies, such as regulations and inspections, training infrastructure, maintenance, performance testing, life-cycle planning, and nuclear security culture.

Additionally, GMS provides technical and policy support to multilateral organizations, including the International Atomic Energy Agency (IAEA) and Interpol, to further mission objectives.

Highlights of the FY 2017 Budget Request

- Support joint development and execution of nuclear security best practices exchanges and training courses at Centers of Excellence (COEs) in India, Japan, South Korea and China. These COEs will address domestic nuclear security training requirements, and provide a forum for bilateral and regional best practice exchanges.
- Fund ongoing curriculum development for the national nuclear training center in Kazakhstan. The Kazakhstan national training center is scheduled to be commissioned in December 2016.
- Support nuclear security best practices exchanges and/or training courses with Belarus, Israel, Jordan, Vietnam, and other international partners.
- Complete upgrades at an additional 89 buildings with high-priority radioactive sources (45 domestic sites and 44 international sites).
- Recover an additional 1,515 disused and unwanted radioactive sealed sources from sites located throughout the United States.
- Promote long-term risk reduction both domestically and internationally through engagement on the transition to non-isotopic, alternative technologies; replace 15 high activity, radioactive source-based devices in the United States with non-isotopic technologies.
- Deploy 20 mobile radiation detection systems and provide fixed systems to 19 new sites 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 5 strategic airports in the Middle East, and at small ports in 11 countries in the Middle East, Caucasus, Southeast Asia, and Eastern Europe. Systems at small ports will be used to perform targeted screening of small maritime vessels.

Major Out-year Priorities and Assumptions

Out-year funding levels for GMS totals $1,826,898,000 for FY 2018 through FY 2021. GMS will continue to work with international partners to enhance nuclear and radiological security both bilaterally and through multilateral forums. Civil nuclear programs around the world will continue to expand, requiring a sustained focus on nuclear security best practices, including measures against material diversion, theft, and facility sabotage. Nuclear security COEs in China, India, Japan, and

South Korea, as well as the national training centers in Kazakhstan will be increasingly important to further nuclear security best practices and technical exchanges bilaterally and regionally.

GMS will continue to make priority upgrades to security at radiological sites in the United States and abroad a priority, while also striving to move disused sources to secure disposition sites. Where feasible, GMS will partner with volunteers to replace high activity radiological devices with non-isotopic technologies, thus creating permanent threat reduction and eliminating the need for sustainment of security upgrades. Furthermore, GMS will continue to enhance and sustain partner country capabilities to detect and interdict illicit trafficking. GMS will expand flexible detection initiatives at strategic airports and for targeted screening of small maritime vessels; and support the expansion of nuclear forensics capabilities.

Global Material Security
Funding
(Non-Comparable)

(Dollars in Thousands)

	FY 2015 Enacted	FY 2015 Current	FY 2016 Enacted	FY 2017 Request	FY 2017 vs FY 2016
Global Material Security					
International Nuclear Security	0	0	130,527	46,027	-84,500
Radiological Security	0	0	153,749	146,106	-7,643
Nuclear Smuggling Detection	0	0	142,475	144,975	+2,500
International Contributions[a]	0	0	0	0	0
Total, Global Material Security	**0**	**0**	**426,751**	**337,108**	**-89,643**

Global Material Security
Funding
(Comparable)

(Dollars in Thousands)

	FY 2015 Enacted	FY 2015 Current	FY 2016 Enacted	FY 2017 Request	FY 2017 vs FY 2016
Global Material Security					
International Nuclear Security	134,875	134,875	130,527	46,027	-84,500
Radiological Security	137,833	137,833	153,749	146,106	-7,643
Nuclear Smuggling Detection	151,536	151,536	142,475	144,975	+2,500
International Contributions[a]	0	4,496	0	0	0
Total, Global Material Security	**424,244**	**428,740**	**426,751**	**337,108**	**-89,643**

[a] The FY 2015 Current total includes international contributions of $1,499,920 from Norway, $200,000 from South Korea, $1,732,272 from the United Kingdom, $499,970 from the Netherlands, $318,808 from Finland and $245,340 from New Zealand.

Outyears for Global Material Security Funding

(Dollars in Thousands)

	FY 2018 Request	FY 2019 Request	FY 2020 Request	FY 2021 Request
Global Material Security				
International Nuclear Security	109,300	98,900	91,300	164,878
Radiological Security	148,134	174,749	180,796	195,170
Nuclear Smuggling Detection	151,698	160,771	174,149	177,053
Total, Global Material Security	**409,132**	**434,420**	**446,245**	**537,101**

Global Material Security
Explanation of Major Changes
(Dollars in Thousands)

	FY 2017 vs FY 2016
Global Material Security	
International Nuclear Security: The decrease reflects a commitment to reduce prior year carryover balances, permitting a lower FY 2017 Budget Request.	-84,500
Radiological Security: The decrease reflects the completion of efforts to protect the remaining IAEA Category 1 sources by 2016, as well as a reduction in planned security upgrades made possible by the expansion of efforts to replace cesium 137 blood irradiators with x-ray devices.	-7,643
Nuclear Smuggling Detection and Deterrence: The increase reflects expansion of nuclear forensics cooperative activities.	+2,500
Total, Global Material Security	**-89,643**

Global Material Security
International Nuclear Security

Description

The International Nuclear Security (INS) subprogram works in cooperation with countries worldwide to enhance security of nuclear material in place and during transport by providing support for nuclear material protection, control, and accounting (MPC&A) upgrades and best practices exchanges. INS also conducts technical exchanges and exercises to support continuing improvement and sustainability of MPC&A system effectiveness. INS supports MPC&A projects and technical exchanges in Belarus, China, India, Israel, Japan, Kazakhstan, South Korea, Jordan, Vietnam, and other countries.

INS assists partner countries in developing and maintaining a national-level nuclear security infrastructure that improves security practices and, where applicable, supports the sustainability of U.S.-funded security upgrades. Projects include support in developing and strengthening MPC&A regulations, implementing training and educational programs, developing sustainability planning, enhancing secure transportation, improving protective force capability, improving protection against cyber threats in coordination with the IAEA, and developing and maintaining material control and accounting measurement capabilities. This includes support for Nuclear Security Training Centers of Excellence (COEs) and promotion of their use to maintain nuclear security capacity and expertise in the countries where they are located and as regional resources. INS supports nuclear security culture enhancement activities internationally.

INS also directly supports the International Atomic Energy Agency's (IAEA) Division of Nuclear Security by supporting the development of IAEA nuclear security guidance documents and associated curricula, and providing subject matter experts for IAEA training workshops, International Physical Protection Advisory Service (IPPAS) missions, technical and other consultancies, and senior advisory committees. INS works bilaterally to train foreign partners on physical protection and nuclear security recommendations in IAEA INFCIRC 225/Revision 5 and knowledge security best practices.

FY 2018-FY 2021 Key Milestones

- (2017 –2021) Continue ongoing nuclear security capacity building cooperation in at least 14 core countries and annually initiate capacity building engagement in up to 8 additional countries.
- (2017 - 2021) Complete two annual technical exchange workshops with Belarus to improve nuclear security best practices.
- (2017 - 2021) Complete two annual joint training exercises with India as part of the Center of Excellence engagement.
- (2017 –2021) Conduct six to eight workshops per year in China.
- (2017 –2021) Develop and implement training courses and engage international partners on cyber security best practices for nuclear facilities, and improve on these best practices through development of new cyber security techniques, procedures and technologies.
- (2020) Complete development of fundamental MPC&A curriculum for a national training center in Kazakhstan.

Activities and Explanation of Changes

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs FY 2016
International Nuclear Security $130,527,000	**International Nuclear Security $46,027,000**	**International Nuclear Security -$84,500,000**
• Complete equipment purchases for the national nuclear training center in Kazakhstan; continue to fund curriculum development. • Conduct technical exchanges and workshops on MPC&A topics with Belarus, India, Israel, Japan, Korea and other international partners. • Support courses at partner country training facilities on nuclear security topics. • Continue support for nuclear security in key countries of concern. • Continue ongoing capacity building cooperation on the new physical protection security recommendations in INFCIRC 225/Rev 5. • Continue 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 International Physical Protection Advisory Service Missions, and strengthening of nuclear facility best practices, including cyber security best practices.	• Conduct technical exchanges and workshops on MPC&A topics with Belarus, India, Israel, Japan, South Korea, Jordan, Vietnam, and other international partners. • Support courses at partner country training facilities on nuclear security topics. • Continue ongoing capacity building cooperation on the new physical protection security recommendations in INFCIRC 225/Rev 5. • Continue to support the IAEA in the furtherance of nuclear security initiatives, including development of Nuclear Security Series documents, International Physical Protection Advisory Service 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 MPC&A upgrades, including support for training, procedures, maintenance, equipment repair, critical spare parts, performance testing, and other activities. **FY 2018-FY 2021** • Conduct technical exchanges and workshop on MPC&A topics with Belarus, India, Israel, Japan, Jordan, South Korea, Vietnam and other international partners. • Continue support for enhanced nuclear security culture, promoting the importance of personal responsibility for MPC&A with bilateral partner countries and in cooperation with the IAEA.	• The decrease reflects a commitment to reduce prior year carryover balances, permitting a lower FY 2017 Budget Request.

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs FY 2016
	• Continue U.S. expert technical engagement with China on modern nuclear material security methodologies and best practices, including in support for the COE. • Continue ongoing capacity building cooperation on the new physical protection security. recommendations in INFCIRC 225/Rev 5. • Continue to support the IAEA in the furtherance of nuclear security initiatives, including development of Nuclear Security Series documents, International Physical Protection Advisory Service Missions, and strengthening of nuclear facility best practices, including cyber security best practices. • Continue providing limited sustainability support to nuclear sites with MPC&A upgrades, including support for training, procedures, maintenance, equipment repair, critical spare parts, performance testing, and other activities.	

Global Material Security
Radiological Security

Description

The Radiological Security (RS) subprogram supports the protection, replacement, recovery and disposal of radiological materials from sites worldwide. Each curie of this material that is protected or removed reduces the risk of a terrorist acquiring the material for misuse in a radiological dispersal device or "dirty bomb."

RS protects radioactive sources used for vital medical, research, and commercial purposes; removes and disposes of disused radioactive sources; and reduces the global reliance on radioactive sources through replacement with non-isotopic, alternative technologies.

Protection efforts result in threat reduction by enhancing physical protection of in-use high activity radioactive sealed sources located at soft target sites (e.g., hospitals, universities, etc.) internationally and domestically, which is done in close cooperation with national, regional, and local agencies and the International Atomic Energy Agency. Domestic security efforts build on regulatory requirements to further best practices.

Removal activities support the recovery and disposal of excess or abandoned radiological materials. These include efforts to accelerate the consolidation and disposal of excess domestic radiological sources, the repatriation of high-risk U.S.-origin sources in other countries, and the secure consolidation of other disused or orphaned radiological materials.

Replacing radioactive sources with viable, non-isotopic alternative technologies offers permanent threat reduction. New non-isotopic alternative technologies are entering the market every year. RS is working to disseminate better information on new, alternative technologies and provide cost-sharing incentives to volunteers willing to transition to non-isotopic technologies.

FY 2018 - FY 2021 Key Milestones

- (2018) Complete security upgrades at an additional 90 buildings containing radiological material, resulting in a cumulative total of 2,206 domestic and international buildings secured.
- (2019) Complete security upgrades at an additional 105 buildings containing radiological material, resulting in a cumulative total of 2,311 domestic and international buildings secured.
  (2020) Complete security upgrades at an additional 105 buildings containing radiological material, resulting in a cumulative total of 2,416 domestic and international buildings secured.
- (2021) Complete security upgrades at an additional 105 buildings containing radiological material, resulting in a cumulative total of 2,521 domestic and international buildings secured.
- (2018 – 2021) Remove an additional 6,400 excess and unwanted sealed sources from locations in the United States, resulting in a cumulative total of more than 46,765 sources removed.

Activities and Explanation of Changes

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs FY 2016
Radiological Security $153,749,000	**Radiological Security $146,106,000**	**Radiological Security -$7,643,000**
• Complete security upgrades at an additional 95 domestic buildings containing radiological material, (including a majority of the Category 1 buildings that volunteered in FY 2015). • Complete security upgrades at an additional 42 buildings containing radiological material internationally. • Remove an additional 1,850 excess and unwanted sealed sources from locations in the United States, resulting in a cumulative total of more than 38,850 sources removed. • Recover and dispose or securely store disused or orphaned radiological sources in other countries. • Work with federal, state, and local authorities and the sites to support the sustainability of previously installed security upgrades domestically. • Expand 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. • Work with the IAEA, foreign regulators, and sites to sustain previously installed security upgrades internationally. • Expand replacement activities at buildings that currently use high activity radioactive sources that agree to switch to non-isotopic based technologies.	• Complete security upgrades at an additional 45 domestic buildings and 44 international buildings containing radiological material. • Remove an additional 1,515 excess and unwanted sealed sources from locations in the United States. • Recover and dispose or securely store disused or orphaned radiological sources in other countries. • Work with appropriate authorities and sites to sustain previously installed security upgrades domestically and internationally. • Further the transition to non-isotopic, alternative technologies and replace 15 high activity, radioactive source-based devices in the United States with non-isotopic technologies. **FY 2018 - FY 2021** • Complete security upgrades at an additional 225 domestic buildings containing radiological material, resulting in a cumulative total of 1,088 domestic buildings secured. • Complete security upgrades at an additional 180 international buildings containing radiological material, resulting in a cumulative total of 1,433 international buildings secured. • Remove an additional 6,400 excess and unwanted sealed sources from locations in the United States, resulting in a cumulative total of more than 46,765 sources removed. • Perform limited recovery and disposal (or securely store) of disused or orphaned radioactive sources in other countries.	• The decrease reflects the completion of efforts to protect the remaining IAEA Category 1 sources by 2016, as well as 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 2017 Request	Explanation of Changes FY 2017 vs FY 2016
• Expand 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.	• Work with the appropriate authorities and sites to sustain previously installed security upgrades domestically and internationally. • Continue outreach to increase threat awareness and accelerate efforts to protect highest priority buildings containing radioactive sources. • Expand replacement activities at buildings that currently use high activity radioactive sources that agree to switch to non-isotopic based technologies. • Expand efforts to more efficiently and effectively address out-year scope and find better long-term threat reduction solutions, including deployment of source tracking tools and further development and application of new technologies that do not rely on radioactive sources.	

Global Material Security
Nuclear Smuggling Detection and Deterrence

Description

The Nuclear Smuggling Detection and Deterrence (NSDD) subprogram strengthens the commitment and capacity of foreign governments to detect, interdict, and investigate illicit trafficking in nuclear and other radioactive materials. NSDD's strategy is to enhance partner countries' capacity by providing appropriate radiation detection systems along with associated training, and to maintain and mature capabilities through refresher and advanced training in operations, management, and maintenance support. NSDD deploys its systems at key locations as part of the broader U.S. government layered, defense-in-depth approach to countering nuclear trafficking. NSDD provides radiation detection technology and training to international law enforcement, intelligence, and border security partners. NSDD conducts its work in close collaboration with other U.S. government agencies (e.g. Departments of Homeland Security, State, Defense, and Justice). Through these collaborations, NSDD helps to maximize U.S. government resources aimed at enhancing the capability of law enforcement, intelligence, and border security organizations to counter nuclear smuggling. NSDD also coordinates with the International Atomic Energy Agency (IAEA), the European Union, INTERPOL, and other international organizations to facilitate consistency in the global efforts to counter nuclear smuggling.

NSDD's priorities include addressing remaining gaps in detection capabilities in the Global Nuclear Detection Architecture (GNDA), expansion of flexible detection capabilities for targeted screening at airports and of small maritime vessels, and continued emphasis on improving partner country skills. NSDD optimizes the deployment of radiation detection capabilities based on an analysis of threat, trafficking patterns, and other factors. NSDD also continually assesses detector performance and effectiveness based on extensive performance data.

In FY 2017, NSDD will continue to build partner country commitment and capacity through the conduct of operator trainings, technical training on equipment maintenance repair, as well as topical workshops, drills, exercises and similar events designed to test, evaluate and improve system performance and effectiveness. NSDD will transition an additional 62 sites to indigenous sustainability, bringing the total to 620. NSDD will also continue efforts to attract host-country, regional, international, and industry funding for deployment and sustainment of radiation detection systems through donations, cost-sharing arrangements, and technical exchanges.

NSDD will continue efforts to strengthen foreign partner nuclear forensics analytical capability and best practices, which are integral to a robust program to deter illicit trafficking. NSDD will engage up to 13 partners bilaterally to strengthen nuclear forensics capabilities. NSDD will also work multilaterally with the IAEA and the Global Initiative to Combat Nuclear Terrorism (GICNT) on the development of international guidance documents and best practices and conduct of four events designed to advance partner country technical expertise in nuclear forensics.

FY 2018 - FY 2021 Key Milestones

- (2018) Equip a cumulative total of 634 sites/ports with radiation detection equipment.
- (2018) Deploy a cumulative total of 157 Mobile Detection Systems (MDS).
- (2018) Transition a cumulative total of 684 sites/ports/MDS to indigenous partner country responsibility.
- (2019) Equip a cumulative total of 639 sites/ports with radiation detection equipment.
- (2019) Deploy a cumulative total of 167 MDS.
- (2019) Transition a cumulative total of 741 sites/ports/MDS to indigenous partner country responsibility.
- (2020) Deploy fixed and mobile systems to key locations in Central Asia and Eastern Europe, and provide flexible radiation detection systems for targeted screening of small maritime vessels and at high-priority airports in the Middle East, Eastern Europe, Africa and Asia.
- (2020) Transition a cumulative total of 786 sites/ports/MDS to indigenous partner country responsibility.
- (2020) Deploy fixed and mobile systems to high-priority airports in the Middle East and Asia, contingent upon outcome of future analysis.
- (2021) Deploy fixed and mobile systems to key locations in Central Asia and Eastern Europe, and provide flexible radiation detection systems for targeted screening of maritime small vessels and for high-priority airports in the Middle East, Eastern Europe, Africa and Asia.
- (2021) Transition a cumulative total of 811 sites/ports/MDS to indigenous partner country responsibility.

Activities and Explanation of Changes

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs FY 2016
Nuclear Smuggling Detection and Deterrence $142,475,000	**Nuclear Smuggling Detection and Deterrence $144,975,000**	**Nuclear Smuggling Detection and Deterrence +$2,500,000**
• Provide 20 additional mobile and man-portable systems for use by law enforcement at internal checkpoints in countries of strategic interest. • Continue providing training in equipment maintenance and alarm response to law enforcement in approximately 15 countries. • Complete fixed radiation detection systems at approximately 24 sites in eight countries, focusing on key gaps in the global nuclear detection architecture and major hubs in the global maritime shipping network. • Connect sites to national communications systems in three countries. • Continue to transition full responsibility for the long term operation (sustainability) of over 175 sites/ports where the systems have been installed but are not yet indigenously sustained. • Continue outreach and technical collaboration with governments and industry to encourage and support provision of radiation detection equipment at large-container seaports. • Continue to support development of protocols for partner countries to rapidly coordinate across agencies and mobilize assets during times of enhanced steady state operations. • Support assurance visits to verify continued operation of equipment installed in 55+ countries. • Fund international exercises and workshops, on optimal operation of equipment and improved regional response to trafficking incidents.	• Provide 20 additional mobile and man-portable systems for use by law enforcement at internal checkpoints in countries of strategic interest. • Complete fixed radiation detection systems at approximately 19 sites in eight countries, focusing on 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 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. • Conduct approximately 20 events, workshops or exercises to advance partner country capabilities in radiation detection, equipment maintenance, and forensics capabilities. **FY 2018-FY 2021** • Complete deployment of an additional 21 Mobile Detection systems through 2019 (167 cumulative). • Deploy fixed and mobile systems to key locations in Central Asia and Eastern Europe in FY20-21, numbers contingent on on-going analysis. • Deploy flexible radiation detection capabilities for targeted screening of small maritime vessels	• The increase reflects expansion of nuclear forensics cooperative activities.

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs FY 2016
• Provide technical expertise and support to ongoing indigenous improvements of installed radiation detection programs in partner countries including analysis of data provided to NSDD. • Provide limited technical support to over 490 sites/ports already transitioned to partner country responsibility. • Engage bilaterally with up to 13 foreign partners to strengthen nuclear forensics capabilities. • Work with IAEA and the GICNT on the development of guidance documents best practices, and other key forensics issues.	at 40 locations and at 16 high-priority airports in the Middle East, Eastern Europe, Africa and Asia. • Provide flexible radiation detection capabilities for targeted screening of small maritime vessels and at high-priority airports in the Middle East, Eastern Europe, Africa and Asia. • Continue to transition 806 radiation detection systems (cumulative) to indigenous partner country responsibility. • Continue to develop/provide technical expertise to partner countries. • Provide limited technical support to already transitioned partners. • Engage up to 13 partners annually to strengthen foreign partner nuclear forensics capabilities. • Continue work with the 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 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021
MPC&A Upgrades - Buildings - Cumulative number of buildings containing weapons-usable material with completed MPC&A upgrades.							
Target	221 buildings	N/A	N/A	N/A	N/A	N/A	N/A
Result	221						
Endpoint Target	Complete MPC&A upgrades on a cumulative total of 221 buildings containing weapon-usable nuclear material.						
MPC&A Initiatives - Annual number of total upgrade and sustainability initiatives completed and transitioned to host country.							
Target	7 initiatives completed	N/A	N/A	N/A	N/A	N/A	N/A
Result	7						
Endpoint Target	By the end of FY 2018, complete the sustainability phase of 37 MPC&A initiatives with foreign partners.						
Radiological Buildings Protected - Cumulative number of buildings with high-priority radiological materials secured.							
Target	1,890 buildings	2,027 buildings	2,116 buildings	2,206 buildings	2,311 buildings	2,416 buildings	2,521 buildings
Result	1,958						
Endpoint Target	4394 by 2033						

	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021
Sites - Cumulative number of sites with radiation detection systems deployed.							
Target	575 cumulative sites	599 cumulative sites	618 cumulative sites	634 cumulative sites	639 cumulative sites	N/A	N/A
Result	575						
Endpoint Target	By the end of FY 2019, provide radiation detection systems to approximately 639 cumulative sites.						
Sustainability - Cumulative number of sites with radiation detection systems being indigenously sustained.							
Target	490 cumulative radiation detection systems	558 cumulative radiation detection systems	620 cumulative radiation detection systems	684 cumulative radiation detection systems	741 cumulative radiation detection systems	786 cumulative radiation detection systems	N/A
Result	488						
Endpoint Target	By the end of FY 2020, transfer 786 radiation detection systems to indigenous sustainment.						
Mobile Detection System (MDS): Cumulative number of Mobile Detection Systems deployed.							
Target	97 cumulative MDS	117 cumulative MDS	137 cumulative MDS	157 cumulative MDS	167 cumulative MDS	N/A	N/A
Result	96						
Endpoint Target	By the end of FY 2019, deploy 167 Mobile Detection Systems.						

Global Material Security
Capital Summary

(Dollars in Thousands)

	Total	Prior Years	FY 2015 Enacted	FY 2015 Current	FY 2016 Enacted	FY 2017 Request	FY 2017 vs FY 2016 Request
Capital Operating Expenses Summary (including (Major Items of Equipment (MIE)							
Capital Equipment >$500K (including MIE)	N/A	N/A	314	314	321	328	+7
Plant Projects (GPP) (<$10M)	N/A	N/A	349	349	357	365	+8
Total, Capital Operating Expenses	**N/A**	**N/A**	**663**	**663**	**678**	**693**	**+15**
Capital Equipment > $500K (including MIE)							
Total Non-MIE Capital Equipment (>$500K)	N/A	N/A	314	314	321	328	+7
Total, Capital Equipment (including MIE)	N/A	N/A	**314**	**314**	**321**	**328**	**+7**
Plant Projects (GPP and IGPP) (Total Estimated Cost (TEC) <$10M)							
Total Plant Projects (GPP) (Total Estimated Cost (TEC) <$5M)	N/A	N/A	349	349	357	365	+8
Total, Plant Projects (GPP) (Total Estimated Cost (TEC) <$10M)	N/A	N/A	**349**	**349**	**357**	**365**	**+8**
Total, Capital Summary	**N/A**	**N/A**	**663**	**663**	**678**	**693**	**+15**

Outyears for Global Management Security

(Dollars in Thousands)

	FY 2018 Request	FY 2019 Request	FY 2020 Request	FY 2021 Request
Capital Operating Expenses Summary (including (Major Items of Equipment (MIE)				
Capital Equipment >$500K (including MIE)	335	342	350	358
Plant Projects (GPP) (<$10M)	373	381	389	398
Total, Capital Operating Expenses	**708**	**723**	**739**	**756**
Capital Equipment > $500K (including MIE)				
Total Non-MIE Capital Equipment (>$500K)	335	342	350	358
Total, Capital Equipment (including MIE)	**335**	**342**	**350**	**358**
Plant Projects (GPP) (Total Estimated Cost (TEC) <$10M)				
Total Plant Projects (GPP) (Total Estimated Cost (TEC) <$5M)	373	381	389	398
Total, Plant Projects (GPP) (Total Estimated Cost (TEC) <$10M)	**373**	**381**	**389**	**398**
Total, Capital Summary	**708**	**723**	**739**	**756**

Nonproliferation and Arms Control

Overview

The FY 2017 Nonproliferation and Arms Control Budget Request responds to the national security priorities articulated in the National Security Strategy of the United States and the Nuclear Posture Review, both of which are reflected in the Department of Energy Strategic Plan. These priorities include the efforts to secure or eliminate the world's most vulnerable nuclear weapon materials; dispose of excess nuclear weapon materials in the United States; support the development of new technologies for nonproliferation; promote the secure expansion of nuclear energy; and improve capabilities worldwide to deter and detect the illicit movement of nuclear and radiological materials and technology.

The Nonproliferation and Arms Control (NPAC) program directly contributes to meeting the DOE strategic goal for "Nuclear Security" and plays a critical role in meeting Strategic Objective 6 to reduce global nuclear security threats. The NPAC program also supports the "Nuclear Threat Reduction" pillar described in the NNSA Enterprise Strategic Vision, and is a key component of the integrated nonproliferation, counterterrorism, and emergency response strategies described in NNSA's report, *Prevent, Counter, and Respond—A Strategic Plan to Reduce Global Nuclear Threats (FY 2016-FY 2020)* (NPCR report). 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 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 2017 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 New START Treaty, Plutonium Production Reactor Agreement, Chemical Weapons Convention and Biological and Toxin Weapons Convention.
- 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 global 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 monitored dismantlement of nuclear programs of concern.

Major Outyear Priorities and Assumptions

Outyear funding levels for the NPAC program total $566,192,000 for FY 2018 through FY 2021. Three key assumptions underpin these proposed funding levels: (1) The IAEA safeguards mission will continue to evolve and grow; (2) Countries and non-state actors will continue to pursue WMD related material, technology, and equipment; and (3)T the United States will continue to implement its obligations under existing arms control and nonproliferation treaties and agreements. As a result of these key assumptions, NPAC has established the following major outyear priorities: (1) The NPAC program will continue to strengthen the IAEA safeguards regime by revitalizing the U.S. technical and human capital base that supports safeguards and ensuring the application of safeguards norms and best practices internationally; (2) The NPAC program will continue to develop domestic and global capacity to implement export control obligations and address illicit transfers of

nuclear and dual-use material, technology and equipment; and (3) The NPAC program will continue to develop approaches and test and validate technologies to monitor and verify compliance with arms control and nonproliferation treaties, agreements and regimes.

Nonproliferation and Arms Control Funding (Non-Comparable)

(Dollars in Thousands)

	FY 2015 Enacted	FY 2015 Current	FY 2016 Enacted	FY 2017 Request	FY 2017 vs FY 2016
Nonproliferation and Arms Control					
Nuclear Verification	0	0	29,273	28,773	-500
Nuclear Export Controls	0	0	33,134	32,634	-500
International Nuclear Safeguards	0	0	52,929	52,429	-500
Nonproliferation Policy	0	0	14,867	10,867	-4,000
Total, Nonproliferation and Arms Control	**0**	**0**	**130,203**	**124,703**	**-5,500**

Nonproliferation and Arms Control Funding (Comparable)

(Dollars in Thousands)

	FY 2015 Enacted	FY 2015 Current	FY 2016 Enacted	FY 2017 Request	FY 2017 vs FY 2016
Nonproliferation and Arms Control					
Nuclear Verification	29,204	29,204	29,273	28,773	-500
Nuclear Export Controls	31,924	31,924	33,134	32,634	-500
International Nuclear Safeguards	54,450	54,450	52,929	52,429	-500
Nonproliferation Policy	10,281	10,281	14,867	10,867	-4,000
Total, Nonproliferation and Arms Control	**125,859**	**125,859**	**130,203**	**124,703**	**-5,500**

Outyears for Nonproliferation and Arms Control Funding

(Dollars in Thousands)

	FY 2018 Request	FY 2019 Request	FY 2020 Request	FY 2021 Request
Nonproliferation and Arms Control				
Nuclear Verification	31,342	31,901	32,540	33,160
Nuclear Export Controls	35,481	36,113	36,837	37,539
International Nuclear Safeguards	58,687	59,698	60,854	61,970
Nonproliferation Policy	12,171	12,387	12,636	12,876
Total, Nonproliferation and Arms Control	**137,681**	**140,099**	**142,867**	**145,545**

Nonproliferation and Arms Control
Explanation of Major Changes
(Dollars in Thousands)

	FY 2017 vs FY 2016 Enacted
Nonproliferation and Arms Control	**-500**
Nuclear Verification: Decrease reflects postponement of certain activities related to improving the Comprehensive Nuclear Test Ban Treaty monitoring and verification regime.	
Nuclear Export Controls: Decrease reflects cost-savings achieved through operational efficiencies, most significantly the completion of the transition to a single U.S. government licensing information technology system.	**-500**
International Nuclear Safeguards: Decrease reflects completion of project to upgrade the IAEA's Additional Protocol Reporter software.	**-500**
Nonproliferation Policy: Decrease reflects the reduction in Nuclear Non-Proliferation Treaty-related activities in a non-Review Conference year, and 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.	**-4,000**
Total, Nonproliferation and Arms Control	**-5,500**

Nonproliferation and Arms Control
Nuclear Verification

Description

The Nuclear Verification (NV) subprogram reduces and eliminates proliferation concerns by promoting transparent arms reductions, including through supporting the 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 future initiatives on DOE and NNSA sites. Additionally, the NV subprogram maintains technical readiness to conduct U.S.-led missions to monitor and verifiably dismantle proliferant nuclear programs.

FY 2018 - FY 2021 Key Milestones

- (Sept 2018 – Sept 2021) Annually complete monitoring visits in Russia under the terms of the Plutonium Production Reactor Agreement (PPRA) to ensure the secure storage of Russian plutonium oxide and shutdown Russian plutonium production reactors remain in a non-operational status.
- (Sept 2018 – Sept 2021) Annually provide operations planning and maintain short-notice readiness of previously developed technologies and capabilities to support verifiable U.S.-led dismantlement of nuclear programs in countries of proliferation concern.

Activities and Explanation of Changes (Comparable)

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs FY 2016
Nuclear Verification $29,273,000	**Nuclear Verification $28,773,000**	**Nuclear Verification -$500,000**
• Develop advanced technologies and concepts for future warhead and fissile material transparency and verification regimes, as well as to support the implementation of the New START Treaty and future arms control 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 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. • Continue activities related to nuclear testing limitations, including those required to prepare for the ratification and implementation of the Comprehensive Nuclear-Test-Ban Treaty. • 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. • Maintain accreditation of the Organization for the Prevention of Chemical Weapons (OPCW) laboratory at Lawrence Livermore National Laboratory (LLNL). • Provide operations planning and maintain short-notice readiness of previously developed technologies and capabilities to support	• Develop advanced technologies and concepts for warhead and fissile material transparency 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 required to prepare for the ratification and implementation of the Comprehensive Nuclear-Test-Ban Treaty (CTBT). Support development of aspects of the CTBT monitoring and verification regime, including the International Monitoring System (IMS), supported by the International Data Centre (IDC), and the On-Site Inspection (OSI) regime. • 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	• Decrease reflects a schedule extension to develop a rugged, transportable argon-37 whole air gas processing and nuclear detection field measurement tool for the U.S. national capability for nuclear explosion monitoring.

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs FY 2016
verifiable dismantlement of nuclear programs in countries of proliferation. • Develop, test and evaluate verification procedures and technologies for the dismantlement of uranium and plutonium fuel cycle activities in countries of proliferation concern. • Continue work on U.S. LEU processing data and forms. • Under the terms of the 1993 U.S.-Russia Highly Enriched Uranium Purchase Agreement, support Russian monitoring visits to U.S. nuclear fuel fabrication facilities.	explosions, as well as mitigate geophysical hazards. • Maintain accreditation of the OPCW laboratory at LLNL. • Provide operations planning and maintain short-notice readiness of previously developed technologies and capabilities to support verifiable U.S.-led dismantlement of nuclear programs in countries of proliferation concern. • Develop, test and evaluate verification procedures and technologies for the U.S.-led dismantlement of uranium and plutonium fuel cycle activities in countries of proliferation concern. • Under the terms of the 1993 U.S.-Russia Highly Enriched Uranium Purchase Agreement, support Russian monitoring visits to U.S. nuclear fuel fabrication facilities. **FY 2018 - FY 2021** • Continue to develop advanced technologies and concepts for warhead and fissile material transparency and verification regimes, including for implementation of the New START Treaty, and analysis of the impact of future initiatives on DOE and NNSA sites. • Annually complete monitoring visits in Russia under the terms of the PPRA to ensure the secure storage of Russian plutonium oxide and 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.	

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs FY 2016
	• Annually maintain accreditation of OPCW laboratory at LLNL through annual proficiency activities. • Annually provide operations planning and maintain short-notice readiness of previously developed technologies and capabilities to support verifiable U.S.-led dismantlement of nuclear programs in countries of proliferation concern. • Develop, test and evaluate verification procedures and technologies for the U.S.-led dismantlement of uranium and plutonium fuel cycle activities in countries of concern.	

Nonproliferation and Arms Control
Nuclear Export Controls

Description

These activities were previously performed under the subprogram name Nuclear Controls in FY 2016. This clearer title allows for a more accurate description of our work. The Nuclear Export Controls (NC) subprogram facilitates legitimate 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 does so by implementing 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.

FY 2018-FY 2021 Key Milestones

- (Sept 2018 - Sept 2021) Annually perform reviews of approximately 6,000 export licenses for a total of 24,000 by September 2021.
- (Sept 2018 - Sept 2021) Provide approximately 3,000 comprehensive and real-time commodity assessments per year for a total of 12,000 by September 2021.

Activities and Explanation of Changes (Comparable)

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs FY 2016
Nuclear Controls $33,134,000	**Nuclear Controls $32,634,000**	**Nuclear Controls -$500,000**
• Engage 25-35 foreign partners to strengthen national systems of export control and prevent illicit trafficking in WMD commodities through export licensing and enforcement training programs. • Train 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. • Perform approximately 6,000 technical reviews of export licenses for 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. • Provide approximately 3,000 real-time technical interdiction case analyses per year and provide 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. • Train 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. • Perform approximately 6,000 technical reviews of export licenses for 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 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 Iran under the Procurement Working Group of	• Decrease reflects cost-savings achieved through operational efficiencies, most significantly the completion of the transition to a single U.S. government licensing information technology system.

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs FY 2016
	the JCPOA and develop an information technology tracking system for all such requests. **FY 2018-FY 2021** • Engage 35-40 foreign partners annually to strengthen national export control systems and prevent illicit trafficking in WMD-related commodities through export licensing and enforcement training programs. • Train U.S. export enforcement officials in partnership with the E2C2 and collaborate with CBP's National Targeting Center. • Perform approximately 6,000 technical reviews of export licenses for dual-use commodities per year. • Provide technical reach back support to the U.S. enforcement community and provide approximately 3,000 real-time interdiction case technical analyses per year. • Maintain and support information technology systems to support export control licensing, interdiction analysis, and the multilateral nonproliferation export control regimes. • Continue providing technical review of proposed transfers of items, materials, goods, and technology to Iran under the Procurement Working Group of the JCPOA and maintain the information technology tracking system for all such requests.	

Nonproliferation and Arms Control
International Nuclear Safeguards

Description

These activities were previously performed under the subprogram name Nuclear Safeguards and Security in FY 2016. This clearer title allows for a more accurate description of our work. 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 will provide support to the IAEA to monitor compliance with the JCPOA.

FY 2018-FY 2021 Key Milestones

- (Sept 2018 – Sept 2021} Transfer a cumulative total of 20 tools to be used in international regimes and by other countries that address an identified safeguards deficiency (5 tools transferred per fiscal year).
- (Sept 2018 – Sept 2021) Perform a cumulative total of 24 bilateral assessments of the physical security of U.S.-obligated nuclear material located at foreign facilities in order to ensure the security of U.S.-obligated material and reduce the threat of nuclear terrorism.

Activities and Explanation of Changes (Comparable)

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs FY 2016
Nuclear Safeguards and Security $52,929,000	**International Nuclear Safeguards $52,429,000**	**International Nuclear Safeguards -$500,000**
• Implement U.S.-IAEA safeguards obligations at DOE facilities including annual reporting requirements as required by U.S. laws and treaty obligations. • Strengthen 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. • Demonstrate and transfer new technologies designed to enhance inspector capabilities in high-priority areas such as in-field analysis and detection of undeclared activities at declared facilities. • Test spent fuel non-destructive assay technologies with foreign partners. • Demonstrate proof-of-concept for a global identification and monitoring system of UF6 cylinders; continue field testing and finalizing advanced safeguards concepts for Gas Centrifuge Enrichment Plants (GCEPs) for transfer to the IAEA; pursue promising cost-effective safeguards approaches for declared nuclear facilities; develop an integrated safeguards concept for electrochemical processing based on R&D conducted with international partners; and promote Safeguards by Design as a standard industry practice. • Provide customized training to more than 25 countries to ensure effective implementation	• Implement U.S.-IAEA safeguards obligations at DOE facilities including annual reporting requirements as required by U.S. laws and treaty obligations. • Provide in-kind support in the form of technical and technology assistance to the IAEA to implement the JCPOA. • Cooperate with the U.S. interagency 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; complete analyses of cyber risks to the international safeguards system. • 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) enhance inspector capabilities in high-priority areas such as in-field analysis and detection of undeclared activities at declared facilities including for destructive analysis. • Maintain qualified and knowledgeable safeguards staff at the U. S. National Laboratories and IAEA through nonproliferation	• Decrease reflects the completion of the project to upgrade the IAEA's Additional Protocol Reporter software.

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs FY 2016
of Comprehensive Safeguards Agreements and Additional Protocols. • Partner with the IAEA and advanced nuclear partners to conduct joint nuclear safeguards outreach to existing partner countries and additional "nuclear newcomer" states. • Maintain 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. • Lead six to eight U.S. government assessments of the physical protection of U.S.-obligated nuclear materials at foreign facilities.	curriculum development in at least 10 nuclear engineering programs, internships and post-graduate research positions at 9 U.S. National Laboratories, and at least 5 intensive short courses on safeguards. • 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. Laboratories. • Partner with the IAEA and advanced nuclear partners to field test advanced safeguards technologies to enhance state declarations and optimize safeguards resource allocations and conduct joint nuclear safeguards outreach to existing partner countries and additional "nuclear newcomer" states. • Provide customized training to more than 25 countries to ensure effective implementation of Comprehensive Safeguards Agreements and Additional Protocols. • Lead 6 - 8 U.S. government assessments of the physical protection of U.S.-obligated nuclear materials at foreign facilities. **FY 2018-FY 2021** • Continue to implement U.S.-IAEA safeguards obligations at DOE facilities as required under U.S law and treaty obligations. • Provide in-kind support in the form of technical and technology assistance to the IAEA to implement the JCPOA. • Develop and refine advanced concepts and approaches to international safeguards that will result in more effective and efficient IAEA	

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs FY 2016
	verification and that align with the IAEA strategic and long term R&D plans. • Support continued education and training opportunities for young and mid-career professionals to meet the nonproliferation and safeguards core capability needs of the U.S. National Laboratories. • Continue to strengthen the international safeguards regime through the implementation of the State Level Approach. • Continue development of an integrated safeguards concept for electrochemical processing based on R&D conducted with international partners. • By the end of FY 2021, transfer 20 tools to be used in international regimes and by other countries that address an identified safeguards deficiency (5 tools transferred per fiscal year). • Demonstrate and test advanced safeguards technologies that will enhance the effectiveness and efficiency of international safeguards implementation. • Maintain support for accredited IAEA Network of Analytical Laboratories (NWAL) at U.S. laboratories. • Work with a cumulative total of 35-40 international partners to support and enhance nuclear safeguards implementation at all stages of civil nuclear development by the end of FY 2021. • Annually review the physical security of U.S.-obligated nuclear material located at foreign facilities in order to ensure the security of U.S.-obligated material at foreign facilities and reduce the threat of nuclear terrorism, for a cumulative	

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs FY 2016
	total of 24 bilateral assessments by the end of FY 2021.	

Nonproliferation and Arms Control
Nonproliferation Policy

Description

The Nonproliferation Policy (NP) subprogram develops and implements programs, strategies and policies to address nonproliferation challenges and opportunities. It also 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 and undertakes activities to improve and update multilateral nuclear supplier arrangements and identify 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 United States will be used for peaceful purposes. Finally, the NP subprogram supports a small nonproliferation and nuclear stability-focused engagement program with key nuclear stakeholders in India, Pakistan, China, Egypt and Burma.

FY 2018-FY 2021 Key Milestones

- (Sep 2019) Provide technical assistance for a cumulative total of 8-12 civil nuclear cooperation Section 123 Agreements and their administrative arrangements.
- (Sep 2018 – Sep 2021) Process between 160-200 Part 810 specific authorization applications and requests for amendments, including the provision of end use and technical reviews and review of associated specific authorization reports and notifications to ensure activities comply with Part 810 and fall within the scope of the existing license.
- (Sep 2018 – Sep 2021) Review over 400 Part 810 general authorization reports for compliance with Part 810 regulations and respond to requests for determination.
- (Sep 2018 – Sep 2021) Transition Track 1.5 regional stability and arms control activities and associated measures that have been adopted into government-to-government interactions in South Asia.
- (Sep 2018 – Sep 2021) Identify and engage emerging nonproliferation decision makers in Egypt and Turkey.

Activities and Explanation of Changes (Comparable)

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs FY 2016
Nonproliferation Policy $14,867,000	**Nonproliferation Policy $10,867,000**	**Nonproliferation Policy -$4,000,000**
• Provide technical assistance to the negotiation of up to three Section 123 Agreements for Cooperation and their administrative arrangements. • Work 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. • Support implementation of the concept of industry self-regulation within the NSG Guidelines. • Maintain the NSG Information-Sharing System (NISS) and the NISS Forum, which will help coordinate work undertaken under the NSG Technical Experts Group (TEG). • Perform a comprehensive update of the NSG Trigger List and Dual Use Annex Handbooks by December 2015. • Process between 40-50 Part 810 specific authorization applications and requests for amendments, including the provision of end-use and technical reviews. Review specific authorization reports and notification to ensure activities comply with Part 810 and fall within 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. • Implement 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. • Work with the 48-member 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. • Support implementation of industry self-regulation concept within the NSG guidelines. • Maintain the NSG Information-Sharing System (NISS) and the NISS Forum and work to develop and deploy 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. • Conduct analyses of the impact of NPT-related 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. • Expand cooperation with P3 and P5 countries on fissile material transparency.	• Decrease reflects the reduction in Nuclear Non-Proliferation Treaty-related activities in a non-Review Conference year, and a return to baseline funding following the one-time increase of $3.5 million over the baseline provided by Congress in the FY2016 budget for improvements in the export control process.

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs FY 2016
• Conduct analyses of the impact of Nonproliferation Treaty (NPT)-related developments on NNSA weapons and nonproliferation work and promote U.S. interests in the NPT. • Prepare DOE/NNSA complex for potential FMCT verification. • Expand cooperation with P3 and P5 countries on fissile material transparency. • Conduct Track 1.5 engagements in India, Pakistan, China and Burma, and leverage 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, China, and Burma, and leverage these efforts to build capacity for greater regional and government-to-government cooperation in arms control, nonproliferation, and disarmament issues. • Initiate new interactions with Egypt and Turkey aimed at building regional stability and nonproliferation norms. • Grow South Asia-focused social media and web presence to promote engagement and regional stability. **FY 2018-FY 2021** • Provide technical assistance to up to three Section 123 Agreements for Cooperation and their administrative arrangements per year. • Work with the 48-member 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. • Support implementation of industry self-regulation concept within the NSG Guidelines. • Maintain the NSG Information-Sharing System (NISS) and the NISS Forum, which will help coordinate work undertaken under the NSG Technical Experts Group. • Process 40-50 Part 810 specific authorization applications and requests for amendments per year, including end use and technical reviews. Review specific authorization reports and notifications for compliance with Part 810 and the scope of the existing license.	

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs FY 2016
	• Review over 100 Part 810 general authorization reports for compliance with Part 810 regulations per year and respond to requests for determination. • Conduct analyses of the impact of NPT-related developments on NNSA weapons and nonproliferation work and promote U.S. interests in the NPT. • Consider implications for DOE/NNSA complex of a potential FMCT verification regime. • Advance cooperation with P3 and P5 countries on fissile material transparency. • Promote regional stability and confidence building measures in the Middle East (Egypt, Turkey and Saudi Arabia) India, Pakistan, China and Burma through Track 1.5 engagement. Focus also on growth in use of social media, internet video and "big data" to promote confidence building and nonproliferation themes.	

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 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021
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	35 countries	36 countries	37 countries	38 countries	39 countries	40 countries	41
Result	35						
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.						
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	5 tools	5 tools	5 tools	5 tools
Result	5						
Endpoint Target	Annually transfer tools to international regimes and other countries to address identified safeguards deficiencies. Note: Change "deployed" to "transferred" to more accurately describe the process by which the NPAC Safeguards program achieves its mission and to eliminate redundancy in the current measure. Adjusting endpoint to recognize an annual, continuing effort.						
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	6 assessments	6 assessments	6 assessments	6 assessments
Result	6						
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.						

Defense Nuclear Nonproliferation Research and Development (DNN R&D)

Overview

The FY 2017 Defense Nuclear Nonproliferation Research and Development (DNN R&D) Budget Request demonstrates a direct connection between the proposed activities and national security priorities articulated in the National Security Strategy of the United States and the Nuclear Posture Review, as well as in the Department of Energy Strategic Plan. The Budget Request also highlights the crosscutting nature of the DNN R&D program, which serves both the requirements of other elements of the DNN Office as well as external stakeholders. The DNN R&D program directly contributes to meeting the DOE strategic goal for Nuclear Security, specifically in Strategic Objective 6, to reduce global nuclear security threats. The DNN R&D program also supports the "Nuclear Threat Reduction" pillar and the "Science, Technology, and Engineering" cross-cutting function described in the NNSA Enterprise Strategic Vision, and is a foundational component of the integrated nonproliferation, counterterrorism, and emergency response strategies described in NNSA's report, *Prevent, Counter, and Respond—A Strategic Plan to Reduce Global Nuclear Threats (FY 2016-FY 2020)* (NPCR report). The DNN R&D program makes these strategic contributions through the innovation of unilateral and multi-lateral technical capabilities to detect, identify, locate, and characterize: 1) foreign nuclear weapons program activities; 2) illicit diversion of special nuclear materials; and 3) global nuclear detonations. In addition, this DNN R&D Budget Request incorporates R&D to support nuclear counterterrorism and incident response activities.

To meet national and Departmental nuclear security requirements, DNN R&D leverages the unique facilities and scientific skills of the Department of Energy, academia, and industry to perform research, including, Nuclear Counterterrorism and Incident Response (NCTIR) related R&D, conduct technology demonstrations, and develop prototypes for integration into operational systems.

Highlights of the FY 2017 Budget Request

Discrete, multi-year DNN R&D goals to be achieved in FY 2017 include:

- Advancing the next generation of technologies and methods to detect uranium production and plutonium reprocessing activities;
- Advancing material and warhead detection and monitoring capabilities, including for counterterrorism and incident response purposes; and,
- Delivering 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 will support a broad set of nuclear nonproliferation and nuclear security initiatives for the detection of special nuclear material (SNM) production, safeguards, threat interdiction, and the underlying technical capabilities that support nonproliferation and counterterrorism/incident response requirements. The program will 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 recent Defense Science Board study findings in its leading the interagency in coordination of related monitoring and verification activities. And 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.

Major Outyear Priorities and Assumptions

Outyear funding levels for the DNN R&D program total $1,951,684,000 for FY 2018 through FY 2021. This funding will support DNN R&D in advancing the detection capabilities that address current and projected threats to national security posed by the proliferation of nuclear weapons and diversion of special nuclear material. The funding also contributes substantially to the success of international nuclear treaties and agreements, which depend in part upon having the technical means and policy context to support negotiations and detect non-compliance with existing treaties. Additionally, DNN R&D funding supports the advancement of R&D for nuclear counterterrorism and incident response. Finally, approximately one-third of this funding is for production of sensors to support the nation's operational nuclear detonation detection capability and reporting infrastructure through joint programs with the Department of Defense (DOD).

Defense Nuclear Nonproliferation Research and Development (DNN R&D)
Funding

(Dollars in Thousands)

	FY 2015 Enacted	FY 2015 Current	FY 2016 Enacted	FY 2017 Request	FY 2017 vs FY 2016
Defense Nuclear Nonproliferation R&D					
Proliferation Detection	240,210	234,027	251,066	237,655	-13,411
Nuclear Detonation Detection	153,191	152,281	168,267	156,267	-12,000
SBIR/STTR (non-add)	7,093	7,093	7,802	7,793	-9
Total, Defense Nuclear Nonproliferation R&D	**393,401**	**386,308**	**419,333**	**393,922**	**-25,411**

Small Business Innovation Research (SBIR)/Small Business Technology Transfer (STTR):

- FY 2015 Transferred: SBIR: $6,233; STTR: $860
- FY 2016 Projected: SBIR: $6,784; STTR: $1,018
- FY 2017 Request: SBIR: $6,832; STTR: $961

Outyears for Defense Nuclear Nonproliferation Research and Development
Funding

(Dollars in Thousands)

	FY 2018 Request	FY 2019 Request	FY 2020 Request	FY 2021 Request
Defense Nuclear Nonproliferation R&D				
Proliferation Detection	288,782	294,356	303,272	306,405
Nuclear Detonation Detection	187,895	192,161	188,851	189,962
SBIR/STTR (non-add)	9,456	9,643	9,874	9,971
Total, Defense Nuclear Nonproliferation R&D	**476,677**	**486,517**	**492,123**	**496,367**

Small Business Innovation Research (SBIR)/Small Business Technology Transfer (STTR):

- FY 2018 Request: SBIR: $8,290; STTR: $1,166
- FY 2019 Request: SBIR: $8,454; STTR: $1,189
- FY 2020 Request: SBIR: $8,657; STTR: $1,217
- FY 2021 Request: SBIR: $8,742; STTR: $1,229

Defense Nuclear Nonproliferation Research and Development
Explanation of Major Changes
(Dollars in Thousands)

	FY 2017 vs FY 2016
Defense Nuclear Nonproliferation Research and Development	
Proliferation Detection (PD): The decrease includes a $2,400,000 portion of projected savings resulting from a change in the NNSA strategy regarding the reimbursement of contractor pension funding (see NNSA Pension Exhibit for pension financing strategy explanation of change) and a reduction in planned activities for arms control-related R&D.	-13,411
Nuclear Detonation Detection (NDD): The decrease reflects a return to baseline after initial development of a mitigation path for supply chain interruptions.	-12,000
Total, Defense Nuclear Nonproliferation Research and Development	**-25,411**

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, including nuclear counterterrorism and 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 are targeted towards the detection, identification, location, and characterization of foreign nuclear weapons program activities; (2) Nuclear Weapons and Material Security supports the development of nuclear security and nuclear arms control treaty monitoring and verification tools and applications, as well as operational interdiction, radiological source replacement, and nuclear security efforts across NNSA; (3) Nonproliferation Enabling Capabilities supports 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 a university research program. The field demonstration program spirals research around 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.

FY 2018-FY 2021 Key Milestones

- (2018) Demonstrate new capabilities for detecting weapons production processes.
- (2018) Demonstrate new capabilities for material security, including, SNM movement detection, and nuclear safeguards.

Activities and Explanation of Changes

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs FY 2016
Proliferation Detection $251,066,000	**Proliferation Detection $237,655,000**	**Proliferation Detection -13,411,000**
• Provide for advanced sensor and algorithm development around operational testing at the sensor development test bed; achieve 2016 goals to demonstrate technologies and methods for foreign uranium production detection; demonstrate capability to persistently and remotely monitor nuclear material processing facilities. • Achieve 2016 NNSA Strategic Plan goal to demonstrate the End-to-End campaign's initial warhead monitoring and chain-of-custody capabilities in support of new arms control commitments; achieve 2016 NNSA Strategic Plan initiative to demonstrate remote monitoring capabilities for reactor operations. • Prepare for first nuclear test monitoring experiment for seismic source physics in the third (and most geologically complex) of three planned test beds, as per long-term test plan; support the NNSA's portion of the Integrated University Program to address basic gaps in nuclear nonproliferation and treaty compliance monitoring research. • Provide nuclear and energetic materials characterization data to meet requirements of Nuclear Counterterrorism and Incident Response (NCTIR) programs.	• Develop next generation nuclear detection technologies; provide for advanced sensor and algorithm development via operational testing at the sensor development test bed; demonstrate new capabilities for detecting weapons production processes. • Develop new capabilities for material security, including SNM movement detection and nuclear safeguards. • Develop and validate cross-cutting models, algorithms, methods, and operational capabilities; begin test monitoring experimentation for seismic source physics in the second-phase test bed and continue to prepare third-phase test bed, as per long-term test plan. Conclude second year of external assessment of overall effectiveness of the Integrated University Program. **FY 2018-FY 2021** • Demonstrate new capabilities for detecting weapons production processes, completing multi-year metric. Develop next generation nuclear detection technologies; provide for advanced sensor and algorithm development around operational testing at the sensor development test bed. • Demonstrate in 2018 new capabilities for material security, including SNM movement detection and nuclear safeguards. • Develop and validate cross-cutting models, algorithms, methods, and operational	• Decrease reflects the reduction of activities in arms control-related R&D.

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs FY 2016
	capabilities; conduct test monitoring experimentation for seismic source physics in the second and third test beds, per long-term test plan. Conclude final year of second and third university consortia and external assessment of the Integrated University Program and solicit proposals for follow-on university consortia, if required.	

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 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.

FY 2018 - FY 2021 Key Milestones

- (Sep 2018 - 2021) Maintain the nation's space based global nuclear detonation detection capability by delivering scheduled sensor payloads and supporting payload-side integration, pre-launch and post-launch testing.

Activities and Explanation of Changes

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs FY 2016
Nuclear Detonation Detection $168,267,000	**Nuclear Detonation Detection $156,267,000**	**Nuclear Detonation Detection $-12,000,000**
• Deliver Global Burst Detector (GBD) nuclear detonation detection payloads for Global Positioning System (GPS) block III satellites in accordance with the negotiated schedule with USAF. Support payload-side technical integration, pre-launch and on-orbit testing activities for previously delivered payloads. Continues development and production of a treaty monitoring focused payload. Continues required engineering development work and satellite interface coordination to support payload design update for subsequent satellite blocks for GBDs and treaty monitoring focused payloads. • Continue baseline schedule for advancing research, technology development, and related science to improve pre- and post-detonation technical nuclear forensic capabilities. Continue to develop and test technical means to assess recent origins of bulk samples of SNM. • Provide 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. Continue to integrate products of source physics experiments and other field and laboratory test campaigns into methods to improve event discrimination. Develop analytical improvements that enable sustained level of performance with reduced operator time.	• Deliver GBD nuclear detonation detection payloads for Global Positioning System (GPS) block III satellites in accordance with the negotiated schedule with USAF. Support payload-side technical integration, pre-launch and on-orbit testing activities for previously delivered payloads. Continue development, production and satellite integration of treaty monitoring focused payload. Continue required engineering development work and satellite interface coordination to support payload design update for subsequent satellite blocks for GBDs. • Develop pre- and post-detonation technical nuclear forensic capabilities. Continue to develop and test technical means to assess recent origins of bulk samples of SNM. Address research priorities that undergird the technical capability of operational assets. • Develop, demonstrate, validate and support capabilities to improve geophysical models of seismic signals from underground detonations and to improve technologies to detect radionuclide releases. Continue to integrate products of field and laboratory test campaigns into methods to improve event discrimination. **FY 2018 - FY 2021** • Deliver GBD nuclear detonation detection payloads for Global Positioning System (GPS) block III satellites in accordance with the negotiated schedule with USAF. Support payload-side technical integration, pre-launch	• The decrease reflects a return to baseline after initial development of a mitigation path for supply chain interruptions.

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs FY 2016
	and on-orbit testing activities for previously delivered payloads. Continue development, production and satellite integration of treaty monitoring-focused payload. Continue required engineering development work and satellite interface coordination to support payload design update for subsequent satellite blocks for GBDs and treaty monitoring-focused payloads. • Conduct research, technology development, and related science to improve pre- and post-detonation technical nuclear forensic capabilities. Continue to develop and test technical means to assess recent origins of bulk samples of special nuclear materials. Address research priorities that undergird the technical capability of operational assets. • Develop, demonstrate, validate, and support capabilities to improve geophysical models of seismic signals from underground detonations and to improve technologies to detect radionuclide releases. Continue to integrate products of field and laboratory test campaigns into methods to improve event discrimination.	

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 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021
Plutonium Production Detection - Cumulative percentage of progress toward demonstrating the next generation of technologies and methods to detect plutonium production 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	N/A	N/A	N/A	N/A
Result	100						
Endpoint Target	By the end of FY 2015, demonstrate the next generation of technologies and methods to detect plutonium production activities.						
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	90% index	90% index	90% index	90% index
Result	90						
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.)						
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	95% of progress	100% of progress	N/A	N/A	N/A	N/A	N/A
Result	95						
Endpoint Target	By the end of FY 2016, demonstrate the next generation of technologies and methods to detect uranium-235 production activities.						
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	50% of progress	70% of progress	90% of progress	100% of progress	N/A	N/A	N/A
Result	50						
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.						

	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021
Nuclear Weaponization and Material Production Detection - Cumulative percentage of progress toward demonstrating improvements in detection and characterization capabilities of nuclear weapons production activities.							
Target	50% of progress	70% of progress	90% of progress	100% of progress	N/A	N/A	N/A
Result	50						
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.						

Defense Nuclear Nonproliferation Research and Development
Capital Summary

(Dollars in Thousands)

	Total	Prior Years	FY 2015 Enacted	FY 2015 Current	FY 2016 Enacted	FY 2017 Request	FY 2017 vs FY 2016 Request
Capital Operating Expenses Summary (including (Major Items of Equipment (MIE)							
Capital Equipment >$500K (including MIE)	N/A	N/A	39,270	39,270	40,134	41,017	+883
Plant Projects (GPP) (<$10M)	N/A	N/A	714	714	730	746	+16
Total, Capital Operating Expenses	**N/A**	**N/A**	**39,984**	**39,984**	**40,864**	**41,763**	**+899**
Capital Equipment > $500K (including MIE)							
Total Non-MIE Capital Equipment (>$500K)	N/A	N/A	39,270	39,270	40,134	41,017	+883
Total, Capital Equipment (including MIE)	N/A	N/A	**39,270**	**39,270**	**40,134**	**41,017**	**+883**
Plant Projects (GPP and IGPP) (Total Estimated Cost (TEC) <$10M)							
Total Plant Projects (GPP) (Total Estimated Cost (TEC) <$5M)	N/A	N/A	714	714	730	746	+16
Total, Plant Projects (GPP) (Total Estimated Cost (TEC) <$10M)	N/A	N/A	**714**	**714**	**730**	**746**	**+16**
Total, Capital Summary	**N/A**	**N/A**	**39,984**	**39,984**	**40,864**	**41,763**	**+899**

Outyears for Defense Nuclear Nonproliferation Research and Development

(Dollars in Thousands)

	FY 2018 Request	FY 2019 Request	FY 2020 Request	FY 2021 Request
Capital Operating Expenses Summary (including (Major Items of Equipment (MIE)				
Capital Equipment >$500K (including MIE)	41,919	42,841	43,784	44,747
Plant Projects (GPP) (<$10M)	762	779	796	814
Total, Capital Operating Expenses	**42,681**	**43,620**	**44,580**	**45,561**
Capital Equipment > $500K (including MIE)				
Total Non-MIE Capital Equipment (>$500K)	41,919	42,841	43,784	44,747
Total, Capital Equipment (including MIE)	**41,919**	**42,841**	**43,784**	**44,747**
Plant Projects (GPP) (Total Estimated Cost (TEC) <$10M)				
Total Plant Projects (GPP) (Total Estimated Cost (TEC) <$5M)	762	779	796	814
Total, Plant Projects (GPP) (Total Estimated Cost (TEC) <$10M)	**762**	**779**	**796**	**814**
Total, Capital Summary	**42,681**	**43,620**	**44,580**	**45,561**

Nonproliferation Construction

Overview

The FY 2017 Budget Request supports national security priorities articulated in the National Security Strategy of the United States and the Nuclear Posture Review, which are reflected in the Department of Energy Strategic Plan. These priorities include efforts to secure or eliminate the world's most vulnerable nuclear weapon materials; dispose of excess nuclear weapon materials in the United States; support the development of new technologies for nonproliferation; promote the secure expansion of nuclear energy; and improve capabilities worldwide to deter and detect the illicit movement of nuclear and radiological materials.

The Nonproliferation Construction Program directly contributes to meeting the DOE strategic goal for "Nuclear Security" and plays a critical role in meeting Strategic Objective 6 to reduce global nuclear security threats. The Nonproliferation Construction Program also supports the "Nuclear Threat Reduction" pillar described in the NNSA Enterprise Strategic Vision, and is a key component of the integrated nonproliferation, counterterrorism, and emergency response strategies described in NNSA's report, *Prevent, Counter, and Respond—A Strategic Plan to Reduce Global Nuclear Threats (FY 2016-FY 2020)* (NPCR report).

Highlights of the FY 2017 Budget Request

In FY 2017 the Mixed Oxide Fuel Fabrication Facility (MFFF) project will be terminated. The Department will complete pre-conceptual design for the dilute and dispose (D&D) option to establish critical decision 0 (CD-0), *Approve Mission Need*, and begin conceptual design in late FY 2017. The D&D option will disposition surplus U.S. weapon-grade plutonium by diluting it and disposing of it at a geologic repository.

Major Outyear Priorities and Assumptions

Outyear funding levels for the Nonproliferation Construction program total $884,000,000 for FY 2018 through FY 2021. The outyear funding profile will be further refined after discussions begin with the contractor to prepare a termination plan for the MFFF and further analyses during the CD process for the D&D option.

Nonproliferation Construction
Funding

(Dollars in Thousands)

	FY 2015 Enacted	FY 2015 Current	FY 2016 Enacted	FY 2017 Request	FY 2017 vs FY 2016
Nonproliferation Construction					
U.S. Construction					
99-D-143 MOX Fuel Fabrication Factility (MFFF)					
MFFF - OPC	10,000	10,000	10,000	15,000	5,000
MFFF - TEC	335,000	335,000	330,000	255,000	-75,000
Total, 99-D-143, MFFF	**345,000**	**345,000**	**340,000**	**270,000**	**-70,000**
Total, U.S. Construction	**345,000**	**345,000**	**340,000**	**270,000**	**-70,000**

Outyears for Nonproliferation Construction
Funding

(Dollars in Thousands)

	FY 2018 Request	FY 2019 Request	FY 2020 Request	FY 2021 Request
Nonproliferation Construction				
U.S. Construction				
99-D-143 MOX Fuel Fabrication Factility (MFFF)				
MFFF - OPC	50,000	150,000	221,000	221,000
MFFF - TEC	171,000	71,000	0	0
Total, 99-D-143, MFFF	221,000	221,000	221,000	221,000
Total, U.S. Construction	**221,000**	**221,000**	**221,000**	**221,000**

Nonproliferation Construction Projects
Explanation of Major Changes
(Dollars in Thousands)

	FY 2017 vs FY 2016
Nonproliferation and Construction Projects	
U.S. Construction – The decrease reflects the termination of the MFFF project.	**-$70,000**
Total, Nonproliferation Construction Projects	**-$70,000**

Nonproliferation Construction
U.S. Construction

Description

The goal of the current Nonproliferation Construction program is to construct facilities to dispose of at least 34 metric tons (MT) of surplus U.S. weapon-grade plutonium in accordance with U.S. policy and the amended U.S.-Russia Plutonium Management and Disposition Agreement (PMDA). The program has been constructing the MFFF, which would enable the Department to dispose of weapon-grade plutonium by fabricating it into mixed oxide fuel and irradiating it in commercial nuclear reactors.

The Consolidated and Further Continuing Appropriations Act, 2015, directed that construction on the MFFF project continue and that cost studies and technology alternative studies be conducted. The National Defense Authorization Act for FY 2015 mandated an independent assessment and validation of the 2014 Plutonium Working Group (PWG) analysis and the Department requested Aerospace Corporation, a federally funded research and development center (FFRDC), conduct this assessment. Aerospace Corporation completed two reports documenting its assessment of the April 2014 analysis. Additionally, in June 2015 the Secretary of Energy assembled a Red Team to assess options for the disposition of surplus weapon-grade plutonium. These analyses confirm that the MOX fuel approach will be significantly more expensive than anticipated and will require approximately $800 million to $1 billion annually for decades. As a result, beginning in FY 2017 the MFFF project will be terminated. The Department will complete pre-conceptual design for the D&D option to establish critical decision-0 (CD-0), *Approve Mission Need*, and begin conceptual design in late FY 2017.

The Department of Energy will request that 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 so that termination can be done efficiently and cost effectively. DOE will issue contract direction to MOX Services as early as practicable to halt construction activities for 90 days while the discussion and development of a termination plan takes place.

As soon as discussions begin with the MOX prime contractor to finalize the details of the termination of the MOX project and the Department approves the termination plan, we will brief the details to the cognizant congressional committees. Approximately 200 craft personnel would be retained to bring the construction site to a safe state and to maintain the facilities, equipment and materials until disposition. Approximately 350 salaried personnel would be retained to maintain the facility in a safe and secure state, manage the prime and subcontracts, settle claims, manage property, and perform other needed activities through FY 2017.

Once the Department issues contract direction to MOX Services, approximately 500 craft personnel will be released and approximately 750 salaried personnel will be released after 60-120 days, with an average of two weeks of severance pay.

50 US Code 2746 requires that if the estimated cost of completing 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 two projects will likely exceed the $3,000,000 threshold:

1. Japan's Fast Critical Assembly (FCA) - President Obama and Japan Prime Minister Abe have committed to completing the removal of all highly enriched uranium (HEU) and plutonium from the FCA in 2016. During FY 2016 and FY 2017, pre-conceptual design will be performed and completed to support a CD-0 Mission Need in FY 2017 at the Savannah River Site (SRS) for a capability to prepare the plutonium for disposition. Funding for the conceptual design is being requested under the Material Management and Minimization Program. Japan will contribute funds for this effort.
2. Dilute and dispose (D&D) program - During FY 2016 and FY 2017, pre-conceptual design will be performed and completed to support a CD-0 Mission Need in FY 2018 at SRS for the D&D program. The D&D option will disposition surplus U.S. weapon-grade plutonium by diluting it and disposing of it at a geologic repository.

The rough order of magnitude cost estimates to complete the conceptual design are between $3,000,000 and $5,000,000 for each of the above planned projects. Therefore, this Budget Request also serves as notification for the expected cost for conceptual design of the two future line item projects.

MFFF – 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.

MFFF – TEC
This activity supports the design, long-lead equipment procurement, site preparation, and construction of the MFFF.

FY 2018-FY 2021 Key Milestones
U.S. Construction
- (Sep 2018) Seek CD-1 approval to begin Preliminary Design for the Japan FCA line item project at SRS
- (Sep 2018) Seek CD-1 approval to begin the Preliminary Design for the D&D line item project at SRS
- (Sep 2021) Complete termination of the MFFF project

Activities and Explanation of Changes

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs FY 2016
U.S. Construction $340,000,000	**U.S. Construction $270,000,000**	**U.S. Construction -$70,000,000**
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 • Continue management oversight and licensing activities.	***MFFF OPC $15,000,000*** • Develop a termination plan with the contractor and begin implementation. **FY 2018-FY 2021** • Scope and costs will be refined in subsequent budget submissions upon the Department's approval of the termination plan for the MFFF project.	***MFFF OPC +$5,000,000*** • The funding change supports termination of the MFFF project.
MFFF TEC $330,000,000 • Sustain activities in plutonium disposition.	***MFFF TEC $255,000,000*** • Develop a termination plan with the contractor and begin implementation. **FY 2018-FY 2021** • Scope and costs will be refined in subsequent budget submissions upon the Department's approval of the termination plan for the MFFF project.	***MFFF TEC - $75,000.000*** • The funding change supports termination of the MFFF project.

Nonproliferation Construction Projects 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 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021
Waste Solidification Building (WSB) - Cumulative percentage of the design, construction, and cold start-up activities completed for the Waste Solidification Building (WSB).							
Target	100% complete	N/A	N/A	N/A	N/A	N/A	N/A
Result	100						
Endpoint Target	Construction and startup activities complete July 2015.						
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	TBD	TBD	TBD	TBD	TBD	TBD
Result	TBD						
	Note: Project will be terminated.						

Nonproliferation Construction
Construction Projects Summary

(Dollars in Thousands)

	Total	Prior Years	FY 2015 Enacted	FY 2015 Current	FY 2016 Enacted	FY 2017 Request	FY 2017 vs FY 2016
99-D-143, MOX Fuel Fabrication Facility (MFFF)							
Total Estimated Cost (TEC)	10,251,519	4,535,277	335,000	335,000	330,000	255,000	-75,000
Other Project Cost (OPC)	2,439,333	320,333	10,000	10,000	10,000	15,000	5,000
Total, 99-D-143, MFFF	**12,690,852**	**4,855,610**	**345,000**	**345,000**	**340,000**	**270,000**	**-70,000**

Outyears to Completion for Nonproliferation Construction[a]

(Dollars in Thousands)

	FY 2018 Request	FY 2019 Request	FY 2020 Request	FY 2021 Request
99-D-143, MFFF				
TEC	171,000	71,000	0	0
OPC	50,000	150,000	221,000	221,000
Total, 99-D-143, MFFF	**221,000**	**221,000**	**221,000**	**221,000**

[a] The outyear funding profile will be further refined after discussions begin with the contractor to prepare a termination plan for the MFFF and further analyses during the CD process for the D&D option.

99-D-143, Mixed Oxide (MOX) Fuel Fabrication Facility,
Savannah River Site (SRS), Aiken, South Carolina
Project is for Design and Construction

1. Significant Changes and Summary

Significant Changes
This construction Project Data Sheet (CPDS) is an update of the FY 2016 CPDS and does not include a new start for the budget year.

In FY 2017 the MOX project will be terminated. The Department will request the MOX prime contractor to 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. DOE will issue contract direction to MOX Services as early as practicable to halt construction activities for 90 days while the discussion and development of a termination plan take place. As soon as discussions begin with the MOX prime contractor to finalize the details of the termination of the MOX project and the Department agrees, we will brief the details to the cognizant congressional committees.

Summary
The most recent Department of Energy (DOE) Order 413.3B approved Critical Decision (CD) is CD-3, Start of Construction, and was approved on April 11, 2007, with a Total Project Cost (TPC) of $4,814,329 and CD-4 of Fiscal Year (FY) 2016. Construction began on August 1, 2007, as directed by the Revised Continuing Resolution, 2007, Public Law 110-5. The latest approved baseline change was on December 17, 2008, with a TPC of $4,857,129 and CD-4 of FY 2017.

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

FY 2015 Project Status
In FY 2015, the overall scope was focused on completing work on the first and second floor of the aqueous processing (AP) area and the first floor of the manufacturing dry process (MP) area while transitioning to commodity installation in the BMP third floor where the FY15 schedule development has identified the most critical activities necessary to support the efficient testing/turnover sequence. Considerable direct support from engineering, procurement, quality and project management resources was provided to support construction. Construction activities in FY 2015 included setting multiple prefabricated pipe modules in the active gallery; structural installation of gloveboxes; installation of dampers, duct and HVAC supports; installation of process pipe and the associated chemical commodity equipment; and installation of electrical equipment and cable trays.

FY 2016 Planned Description of Activities
In FY 2016, the overall scope continues to focus on commodity installation. Primary areas of work include the third floor of the MP area while completing installation activities and closing work packages in the first and second floors of the AP areas. Construction activities include continuing to set prefabricated pipe modules in the active gallery; duct and HVAC supports, installation of 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. The electrical commodities installation will be ramping up on installation of conduit and supports. Procurement of engineered equipment will continue to ramp down. Major balance of plant equipment will continued to be received and installed into the process building. Management will also be focusing on processes and organizational alignment improvements in an effort to reduce level of effort expenditures and use those savings for additional commodity installation. In accordance with DOE Order 413.3B, a performance baseline (PB) deviation occurs when the approved total project cost (TPC), CD-4 completion date, or performance and scope parameters cannot be met. When a deviation occurs, the approving authority must make a specific determination whether to terminate the project or establish a new PB by requesting the FPD to submit a baseline change proposal (BCP). The Department has determined the TPC and completion date cannot be met; therefore the MOX project will start termination procedures.

FY 2017 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/materials 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 sub-contracts and leases. Where cost effective, the MOX prime contractor will be directed to complete existing subcontracts and leases, but to 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 and contract termination is expected to be completed during late calendar year 2017, with final termination complete in fiscal year 2019.

2. 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[c]
FY 2015	1QFY1997		03/22/1999	04/11/2007	4QFY2016	04/11/2007	N/A	TBD[c]
FY 2016	1QFY1997	10/31/1997	03/22/1999	04/11/2007	4QFY2016	04/11/2007	N/A	4QFY2031[c]
FY 2017	1QFY1997	10/31/1997	03/22/1999	04/11/2007	2QFY2016	04/11/2007	N/A	NA

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] Facility, process, and equipment design have been completed.
[b] 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.
[c] The project is being terminated.
[d] 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.

(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)

3. 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[a]	TBD[a]	TBD[a]	TBD[a]	N/A	TBD[a]	TBD[a]
FY 2016	1,072,430[a]	9,179,089[a]	10,251,519[a]	2,439,333[a]	N/A	2,439,333[a]	12,690,852[a]
FY 2017	TBD[b]	TBD[b]	TBD[b]	TBD[b]	N/A	TBD[b]	TBD[b]

[a] This high end cost range reflects the preliminary estimate of the independent assessment of the U.S. Army Corps of Engineers in 2013 at a $500M annual funding limit.
[b] 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.

4. Project Scope and Justification,

Scope and Justification:

The MOX Fuel Fabrication Facility (MFFF) project is being terminated in FY 2017.

5. 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	10,000
FY 2016	N/A	13,000	N/A	1,640
Total, Design	N/A	1,115,430	N/A	1,072,430
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] MOX funded within the Nuclear Energy appropriation.

[b] MOX funded with the Other Defense Activities appropriation.

	(dollars in thousands)			
	Appropriations	Plan	Obligations	Costs
FY 2015	N/A	305,000	N/A	317,476
FY 2016	N/A	317,000	N/A	427,524
FY 2017	N/A	255,000	N/A	225,988
FY 2018	N/A	171,000	N/A	218,269
FY 2019	N/A	71,000	N/A	210,761
FY 2020	N/A	0	N/A	200,858
FY 2021	N/A	0	N/A	TBD
Total, Construction	N/A	4,306,089	N/A	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 unobligated balance)	-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	426,559
FY 2017	255,000	255,000	255,000	225,988
FY 2018	171,000	171,000	171,000	TBD
FY 2019	71,000	71,000	71,000	TBD
FY 2020	0	0	0	TBD
FY 2021	0	0	0	TBD
Total, TEC	TBD	5,421,519	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	N/A	10,000	N/A	15,463
FY 2016	N/A	10,000	N/A	36,960
FY 2017	N/A	15,000	N/A	37,000
FY 2018	N/A	50,000	N/A	TBD
FY 2019	N/A	150,000	N/A	TBD
FY 2020	N/A	221,000	N/A	TBD
FY 2021	N/A	221,000	N/A	TBD
Total, OPC except D&D	N/A	987,310	N/A	TBD

[a] MOX funded within the Nuclear Energy appropriation.

[b] MOX funded with the Other Defense Activities appropriation.

	(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 unobligated balance)	-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	463,519
FY 2017	270,000	270,000	270,000	262,988
FY 2018	221,000	221,000	221,000	TBD
FY 2019	221,000	221,000	221,000	TBD
FY 2020	221,000	221,000	221,000	TBD
FY 2021	221,000	221,000	221,000	TBD
Total, TPC [h]	TBD	6,408,829	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] 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.

6. 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	TBD	12,690,852	4,814,329
Total, Contingency	TBD	1,600,000	850,631

[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.

7. 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	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	TBD
	OPC	310,333	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	TBD
	TPC	4,569,853	345,000	340,000	270,000	221,000	221,000	221,000	221,000	TBD	TBD

[a] These numbers reflect the slow-down of the current plutonium disposition strategy while assessing alternative strategies.
[b] 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.
[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.

8. 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

The MOX Fuel Fabrication Facility (MFFF) project is being terminated in FY 2017.

9. 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.

10. 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.

DOE will issue contract direction to the MOX prime contractor to halt construction activities for 90 days. At the beginning of this 90-day period, the request, discussion and development of a termination plan will commence. As soon as

[a] Project is being terminated.

discussions begin with the MOX prime contractor to finalize the termination of the MOX project and the Department agrees, appropriate congressional sub-committees will be briefed. 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 project and contract termination is expected to be completed during late calendar year 2017, with final termination complete in fiscal year 2019.

Global Threat Reduction Initiative [a]
Funding

(Dollars in Thousands)

	FY 2015 Enacted	FY 2015 Current [b]	FY 2016 Enacted	FY 2017 Request	FY 2017 vs FY 2016
Global Threat Reduction Initiative					
Highly Enriched Uranium (HEU) Reactor Conversion	**119,383**	**119,383**	**0**	**0**	**0**
International Nuclear and Radiological Material Removal and Protection					
Nuclear Material Removal	58,441	58,441	0	0	0
Russian-Origin Nuclear Material Removal	0	0	0	0	0
U.S.-Origin Nuclear Material Removal	0	0	0	0	0
Gap Nuclear Material Removal	0	0	0	0	0
Emerging Threat Nuclear Material Removal	10,095	10,095	0	0	0
International Radiological Material Removal	12,601	13,701	0	0	0
International Material Protection	36,600	38,100	0	0	0
Total, International Nuclear and Radiological Material Removal And Protection	**117,737**	**120,337**	**0**	**0**	**0**
Domestic Radiological Material Removal and Protection					
Domestic Radiological Material Removal	67,987	67,987	0	0	0
Domestic Material Protection	20,645	20,645	0	0	0
Total, Domestic Radiological Material Removal and Protection	**88,632**	**88,632**	**0**	**0**	**0**
International Contributions [c]	**0**	**2,200**	**0**	**0**	**0**
Total, Global Threat Reduction Initiative	**325,752**	**330,552**	**0**	**0**	**0**

[a] Global Threat Reduction Initiative program is being restructured into the Global Material Security program and the Material Management and Minimization program starting in FY 2016.

[b] Reflects an internal reprogramming of $2,600,000 from International Material Protection and Cooperation for International Radiological Removal and Protection activities.

[c] The FY 2015 total includes international contributions of $499,960 from Norway, $200,000 from South Korea, $1,000,000 from the United Kingdom and $499,970 from the Netherlands.

Nonproliferation and International Security [a]
Funding

(Dollars in Thousands)

	FY 2015 Enacted	FY 2015 Current	FY 2016 Enacted	FY 2017 Request	FY 2017 vs FY 2016
Nonproliferation and International Security					
Nuclear Verification	29,204	29,204	0	0	0
Nuclear Controls	35,460	35,460			
Nuclear Safeguards and Security	66,414	66,414	0	0	0
Nonproliferation Policy	10,281	10,281	0	0	0
Total, Nonproliferation and International Security	**141,359**	**141,359**	**0**	**0**	**0**

[a] The Nonproliferation and International Security Program was restructured under the Nonproliferation and Arms Control Program, in addition NIS transferred its two nuclear security capacity-building activities - International Nuclear Forensics Cooperation (formerly Confidence Building Measures) and International Nuclear Security - to the Global Material Security program.

International Material Protection and Cooperation [a]
Funding

(Dollars in Thousands)

	FY 2015 Enacted	FY 2015 Current [b]	FY 2016 Enacted	FY 2017 Request	FY 2017 vs FY 2016
International Material Protection and Cooperation					
Nuclear Warhead Protection	0	0	0	0	0
Weapons Material Protection	4,448	4,448	0	0	0
Material Consolidation and Civilian Sites	114,857	112,257	0	0	0
National Infrastructure and Sustainability Program	3,606	3,606	0	0	0
Second Line of Defense	148,000	148,000	0	0	0
International Contributions [c]	0	2,296	0	0	0
Total, International Material Protection and Cooperation	**270,911**	**270,607**	**0**	**0**	**0**

[a] International Material Protection and Cooperation program is being restructured into the Global Material Security Program starting in FY 2016.

[b] Reflects an internal reprogramming of $2,600,000 to the Global Threat Reduction Initiative for International Radiological Material Removal and Protection activities.

[c] The FY 2015 Current total includes international contributions of $999,960 from Norway, $318,808 from Finland, $732,272 from the United Kingdom and $245,340 from New Zealand.

Fissile Materials Disposition [a]
Funding

(Dollars in Thousands)

	FY 2015 Enacted	FY 2015 Current [b]	FY 2016 Enacted	FY 2017 Request	FY 2017 vs FY 2016
Fissile Materials Disposition					
U.S. Plutonium Disposition	**60,000**	**60,000**	**0**	**0**	**0**
U.S. Uranium Disposition	**25,000**	**35,000**	**0**	**0**	0
Construction					
99-D-141-02 Waste Solidification Building (WSB)	0	0	0	0	0
99-D-143 MOX Fuel Fabrication Factility (MFFF)	345,000	345,000	0	0	0
Subtotal, Construction	**345,000**	**345,000**	**0**	**0**	**0**
Russian Surplus Fissile Materials Disposition	**0**	**0**	**0**	**0**	**0**
Total, Fissile Materials Disposition	**430,000**	**440,000**	**0**	**0**	**0**

[a] The U.S. Plutonium Disposition, U.S. Uranium Disposition, and the Russia Material Disposition sub-programs within the Fissile Materials Disposition program are being restructured into the Material Management and Minimization program starting in FY 2016. The Construction subprogram within the Fissile Materials Disposition program is being restructured into the Nonproliferation Construction program starting in FY 2016.

[b] Reflects reprogramming of $10,000,000 from FY 2014 funding in U.S. Plutonium Disposition to U.S. Uranium Disposition for a new 13.4 metric ton (MT) down-blending contract.

Nuclear Counterterrorism and Incident Response Program

Overview

One of NNSA's enduring missions is to help protect our nation and its interests from the threat of nuclear terrorism. The NNSA Nuclear Counterterrorism and Incident Response (NCTIR) Program 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, and incident response capabilities. Finally, NCTIR also executes DOE/NNSA's Emergency Management and Operations Support program that provides policy and implementation of emergency management for all DOE/NNSA offices and sites, and manages the DOE/NNSA Emergency Operations Centers, Emergency Communications Network and Continuity of Operations Plan (COOP) activities. The FY 2017 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 Response subprogram provides flexible, efficient, and effective nuclear/radiological emergency response capability for any incident domestically 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 to all nuclear/radiological emergencies.

- 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 mission maintains a readiness posture to deploy ground sample collection teams, deploy device disposition and device assessment teams, and conduct laboratory operations in support of bulk actinide and post detonation forensics.

- The Emergency Management element of the Emergency Management and Operations Center (EMOC) subprogram provides all emergency management policy development and activities for the Department, and assists NNSA and DOE sites with implementation of emergency management policies and plans, and by conducting exercises, training, and providing technical support for all-hazards management capability. The Operations Center element of the EMOC subprogram uses the Emergency Communications Network (ECN) to provide technical support to DOE and NNSA sites and deployable teams and complements the all-hazards emergency management mission.

- Counterterrorism Response and Capacity Building leverages unique technical, operational, and threat expertise to conduct cooperative activities addressing a range of nuclear incidents: terror threats to civil nuclear materials and facilities, WMD threats, and international nuclear incidents and accidents. Such capacity-building activities include technical exchanges, workshops, exercises, a full suite of training programs, technical assistance, and equipment provision, all designed to strengthen global nuclear incident preparedness and response capabilities.

- 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. Technical work on device assessment also supports the Department of Defense (DOD), FBI and Intelligence Community planning, and operational capabilities. Technology integration activities include a staged process for targeted tool development over the short and long term.

Highlights of the FY 2017 Budget Request

The FY 2017 Budget Request includes funding to provide technical equipment and training to address the threat of nuclear terrorism and associated threat devices. NNSA partners with the Federal Bureau of Investigation (FBI) to sustain radiological/nuclear device stabilization capabilities in selected cities and provide yearly recurring sustainment training and equipment maintenance. 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 NCT Assessment subprogram will sustain threat device assessment capabilities and unique modeling expertise critical to response capabilities and contingency planning efforts. NCT Assessment will also sustain programs to protect IND design information and manage the assessment of weapon-related open source information. NCT Assessment will also sustain international technical and policy engagements through the Nuclear Threat Reduction (NTR) Channels with the Republic of France and the United Kingdom.

At the request of DOD and in support of national policy objectives, NCT Assessment will gather existing experimental and other data, identify information and modeling gaps, and continue 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 includes experimental and computational investigations that improve our confidence in modeling capabilities.

Finally, the NCTIR program will support bilateral counterterrorism security dialogues with advanced civil nuclear partner countries and capability development of nuclear incident response and WMD counterterrorism capabilities, domestically and with key international partners. This capability development focuses on specialized training and exercises, tailored assistance projects, and exchanges of best practices covering each of these response requirements, in order to build and strengthen comprehensive National and international nuclear threat response awareness and capabilities.

Major Outyear Priorities and Assumptions

Outyear funding levels for the NCTIR Program total $1,020,759,000 for FY 2018 through FY 2021. The outyear numbers for NCTIR reflect major program priorities through the FYNSP period. During this period, the program will:

- Maintain and strengthen the Department's capabilities to manage accidents and emergencies at its operating locations and contribute to the Emergency Management and DOE/NNSA Emergency Operations Center (EOC).
- Sustain mission, maintain readiness and continue Emergency Communications Network Suite upgrades to maintain state of the art capabilities.
- Enhance DOE emergency management policies and practices throughout the DOE complex.
- Maintain and strengthen nuclear/radiological incident response capabilities, including sustainment of existing deployable capabilities, understanding and adapting to changes in proliferation and nuclear terrorism threats, and sustaining unique modeling and device assessment capabilities.
- Adapt to factors such as increasing demand for nuclear/radiological expertise, emergence of new technologies and expanding threats of proliferation and nuclear terrorism.
- Recapitalize emergency response equipment consistent with lifecycle planning to ensure operational readiness is maintained.
- In support of the local FBI and Joint Terrorism Task Forces, sustain existing nuclear counterterrorism capabilities in Stabilization cities.
- Sustain established NTD and IND assessment capabilities.
- Continue standoff disablement capability evaluations.
- Enhance international nuclear/radiological preparedness and response training programs and support, including implementation of the 2015 NTR Work Plan, and sharing of best practices to domestic and foreign partners to reduce terrorism risks to nuclear material and facilities.
- Enhance engagement and address sustainability in order to optimize nuclear incident preparedness and response capacity building with key foreign partners, in response to evolving global trends.

Nuclear Counterterrorism and Incident Response Program
Funding
(Non-Comparable)

(Dollars in Thousands)

	FY 2015 Enacted	FY 2015 Current	FY 2016 Enacted	FY 2017 Request	FY 2017 vs FY 2016
Nuclear Counterterrorism Incident Response					
Emergency Response	142,577	142,577	0	0	0
Emergency Management	5,668	5,668	0	0	0
National Technical Nuclear Forensics	10,250	10,250	0	0	0
Operations Support	14,850	14,850	0	0	0
International Emergency Management and Cooperation	4,595	4,845	0	0	0
Total, Nuclear Counterterrorism Incident Response	**177,940**	**178,190**	**0**	**0**	**0**
Counterterrorism and Counterproliferation Programs					
Counterterrorism and Counterproliferation Programs	46,093	46,093	0	0	0
Total, Counterterrorism and Counterproliferation Programs	**46,093**	**46,093**	**0**	**0**	**0**

Nuclear Counterterrorism and Incident Response Program
Funding
(Comparable)

(Dollars in Thousands)

	FY 2015 Enacted	FY 2015 Current	FY 2016 Enacted	FY 2017 Request	FY 2017 vs FY 2016
Nuclear Counterterrorism & Incident Response Program					
Emergency Response	142,577	142,577	134,192	156,955	+22,763
National Technical Nuclear Forensics	10,250	10,250	10,041	11,400	+1,359
Emergency Management & Operations Center	5,668	5,668	25,112	34,775	+9,663
Counterterrorism Response & Capacity Building	14,850	14,850	7,256	7,500	+244
Nuclear Counterterrorism Assessment	4,595	4,845	57,789	61,251	+3,462
Total, Nuclear Counterterrorism & Incident Response Program	**177,940**	**178,190**	**234,390**	**271,881**	**+37,491**

Outyears for Nuclear Counterterrorism and Incident Response Program
Funding

(Dollars in Thousands)

	FY 2018 Request	FY 2019 Request	FY 2020 Request	FY 2021 Request
Nuclear Counterterrorism Incident Response Program				
Emergency Response	147,808	148,705	152,658	151,878
National Technical Nuclear Forensics	11,400	11,900	11,900	11,900
Emergency Management & Operations Center	26,778	27,455	28,695	29,644
Counterterrorism Response and Capacity Building	7,900	8,100	8,200	8,200
Nuclear Counterterrorism Assessment	59,138	56,100	56,200	56,200
Total, Nuclear Counterterrorism Incident Response Program	**253,024**	**252,260**	**257,653**	**257,822**

Nuclear Counterterrorism and Incident Response Program
Explanation of Major Changes
(Dollars in Thousands)

	FY 2017 vs FY 2016
Nuclear Counterterrorism and Incident Response Program	
Emergency Response: This increase includes funding to build a highly secure mobile communications capability together with key interagency partners in accordance with national policy requirements; replacement of and improvements to deployable technical equipment for emergency response based on recapitalization needs; and execution of joint DOE-FBI Stabilization Program to provide regional tools to address nuclear terrorism threats.	**+22,763**
National Technical Nuclear Forensics: The increase enables full support to Post-Detonation device reconstruction training and exercises; continued preventative and corrective facility maintenance in support of the Pre-Detonation Device Program; and broader infrastructure improvements.	**+1,359**
Emergency Management and Operations Center: The increase supports DOE emergency operations, more comprehensive emergency management policies and practices, and the development of standards for exercises and training.	**+9,663**
Counterterrorism Response and Capacity Building: The increase will support performance of additional international training to high priority partners and engage two additional countries in cooperation to strengthen their nuclear emergency management systems.	**+244**
Nuclear Counterterrorism Assessment: Increased funding is requested for standoff disablement activities.	**+3,462**
Total, Nuclear Counterterrorism and Incident Response Program	**+37,491**

Nuclear Counterterrorism and Incident Response Program
Emergency Response

Description

The Emergency 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 safeguard the public, environment, and emergency responders by providing a responsive, flexible, efficient, and effective nuclear/radiological emergency response capability for any nuclear or radiological incident domestically or abroad by applying the unique technical expertise within NNSA's nuclear security enterprise. The strategic approach for emergency response activities is to ensure a central point of contact and an integrated response to all emergencies. This is accomplished by ensuring the appropriate infrastructure is in place to provide command, control, coordination, and communications. 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.

Other Assets

Additional assets provide assistance to Federal, state and local entities to respond to the potential or actual release of nuclear or radiological materials. These DOE/NNSA teams work closely with other DOE elements as well as other Federal agencies, 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 DOD to prevent nuclear terrorism 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 2017 Request	Explanation of Changes FY 2017 vs FY 2016
Emergency Response $134,192,000 **Nuclear Emergency Support Team**	**Emergency Response $156,955,000** **Nuclear Emergency Support Team**	**Emergency Response +$22,763,000** **Nuclear Emergency Support Team**
• 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 Department of Defense-led exercises in which DOE/NNSA is not the lead agency.	• 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 Department of Defense-led exercises in which DOE/NNSA is not the lead.	• Build and sustain highly secure mobile communications capability, together with key interagency partners, 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.

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs FY 2016
	FY 2018-FY 2021 • 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 the DOE Radiological Triage program. • Sustain Render Safe capabilities for an identified critical mission area in support of Principal Operational Partner. This effort includes predictive capability. • Lead one evolution of interagency NUWAIX 2020 with participation by DOD, FBI, and other federal agencies. • 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. • 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 Department of Defense-led exercises in which DOE/NNSA is not the lead agency. • Continue development of a robust classified communications system in conjunction with mission partners.	

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs FY 2016
Other Assets	**Other Assets**	**Other Assets**
• 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.	• 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. • Begin to recapitalize critical emergency response equipment that has past beyond its planned life cycle. **FY 2018-FY 2021** • 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.	• Recapitalize priority nuclear counterterrorism emergency response equipment including neutron multiplicity detectors, specialized search equipment, and contamination monitoring systems.

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs FY 2016
	• 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. • Serve as a lead federal agency for national-level consequence management exercise in FY 2018 and FY 2021. • Continue to recapitalize critical emergency response equipment that has past beyond its planned life cycle.	
Stabilization Operations	**Stabilization Operations**	**Stabilization Operations**
• Sustain capability for Stabilization cities including training and equipment maintenance.	• 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. **FY 2018-FY 2021** • Sustain capability for existing stabilization cities, including training and equipment maintenance.	• 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.

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 a Homeland Security Council (HSC)/National Security Council (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, readiness to deploy pre- and post-detonation response teams, technical integration, and readiness to conduct bulk actinide laboratory analysis.

Activities and Explanation of Changes

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs FY 2016
National Technical Nuclear Forensics $10,041,000	**National Technical Nuclear Forensics $11,400,000**	**National Technical Nuclear Forensics +$1,359,000**
• 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. • Support to Post-Detonation device reconstruction training and exercises at a reduced level. • Conduct two Disposition and Forensics Evidence Analysis Team (DFEAT) exercises. • LANL PF4 plans and procedure development in support of DFEAT. • Continue preventative and corrective facility maintenance at P-Tunnel, NNSS for support to the Pre-Detonation Device Program. • Maintain an objective operational capability for Bulk SNM Analysis Program (BSAP). • Lead U.S. support to the US/UK 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 to 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. Address broader infrastructure improvements at the NNSS. • LANL PF4 plans and procedure development in support of DFEAT. • Maintain an objective operational capability for BSAP. • Lead U.S. support to the US/UK JOWOG 29 Nuclear Forensics User Group. **FY 2018-FY 2021** • 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 per year and one training event.	• Full support to post-detonation device reconstruction training and exercises. • Continue preventative and corrective facility maintenance at P-Tunnel, NNSS for support to the Pre-Detonation Device Program. Address broader infrastructure improvements at the NNSS.

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs FY 2016
	• Full support to post-detonation device reconstruction training and exercises. • Conduct two DFEAT exercises per year. • LANL PF4 plans and procedure development in support of DFEAT. • Continue preventative and corrective facility maintenance at P-Tunnel, NNSS for the Pre-Detonation Device Program. Address broader infrastructure improvements at the NNSS. • Maintain an objective operational capability for BSAP. • Lead U.S. support to the US/UK JOWOG 29 Nuclear Forensics User Group.	

Nuclear Counterterrorism and Incident Response Program
Emergency Management and Operations Center

Description

The Emergency Management and Operations Center subprogram is focused on emergency preparedness and 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 FY2017 Budget Request will continue to focus on the connection between Emergency Management and Operations Support activities.

The Emergency Management subprogram serves as the single point of contact for implementing and coordinating emergency management policy, preparedness, and response activities within DOE/NNSA, including supporting and coordinating NNSA field and contractor implementation and oversight of emergency management policy.

To strengthen emergency preparedness across DOE/NNSA, this subprogram develops and implements specific programs, plans, 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 Emergency Operations Centers and the ECN. The DOE/NNSA Headquarters Emergency Operations Center 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 Emergency Operations Center will broaden and strengthen its effectiveness through efficiencies developed by the Office of Operations and Exercises and the Office of Preparedness.

The ECN is the Department's communications means to collect, process, and disseminate emergency related information from multiple internal and external sources. The ECN helps DOE/NNSA decision-makers to maintain a common operating picture during the management and support of operational emergencies, energy emergencies, and emergency assistance, including national and international counterterrorism events 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. The 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 Emergency Operations Training Academy (EOTA) is an academically recognized training and development center that remains on the cutting edge of technology and innovation. It is the Office of Emergency Operations point of service for training development to enhance the readiness of personnel in the emergency operations community.

The Continuity Program (CP) continues to include responsibility for all of DOE and NNSA and is a HSC/NSC required policy initiative. These programs develop the headquarters and the field Continuity of Operations and Continuity of Government plans that are updated constantly.

Activities and Explanation of Changes

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs FY 2016
Emergency Management and Operations Center $25,112,000	**Emergency Management and Operations Center $34,775,000**	**Emergency Management and Operations Center +$9,663,000**
• Conduct activities to promote consistency of emergency management practices at DOE/NNSA sites and in implementing emergency planning for severe events. • Continue to implement emergency management policy for DOE/NNSA sites. • Continue to update and implement departmental policy and procedures. • EOTA will continue to serve as the primary point of training for first responder and render safe activities. • Continue with the delivery of intermediate and advanced-level Incident Command System training courses, in addition to business system improvement. • Provide technical assistance to the DOE/NNSA complex to complete actions outlined in Defense Nuclear Facilities Safety Board (DNFSB) Recommendation 2014-01. • Continue maintenance and operation of the ECN in order to meet the national security mission requirements and to support the NNSA network vision. • Continue the replacement or upgrade of servers; desk top computers and lap top systems; printers; switching units; routers; video teleconferencing units; special purpose servers; a new satellite communications system downlink capability; expanded satellite coverage; additional dedicated satellite communications bandwidth;	• Provides contract 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 exercises needed to support emergency operations at full capacity. • Provide Nuclear Incident Team developed efficiencies for an effective all hazards emergency management capability. **FY 2018-FY 2021** • Conduct activities to promote consistency of emergency management practices at DOE/NNSA sites and in implementing emergency planning for severe events. • Continue to implement emergency management policy for DOE/NNSA sites. • Continue to update and implement departmental policy and improved procedures. • EOTA will continue to serve as the primary point of training for first responder and render safe activities, and DOE/NNSA site-specific training. • Continue with the delivery of intermediate and advanced-level Incident Command System training courses, in addition to business system improvement. • Provide critical infrastructure and ensure a secure cyber-environment.	• The increase supports contract support; training for the Unified Command Group and Incident Command Structure; and support exercises to facilitate and adequately integrate emergency response capabilities. • The increase will provide contract support to implement the Criteria Review and Approach Document for all DOE/NNSA headquarters and field and site offices for better integration of emergency preparedness practices. • The increase will support 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.

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs FY 2016
and Internet Protocol Call Manager redundancy for HQ on both the classified and unclassified ECN. • Continue supporting national response, COOP/legacy, forensics, and counterterrorism elements. • Continue to provide critical infrastructure and secure cyber-environment. • Provide continued support for ECN equipment deficiency upgrades and maintenance that begins in FY 2015. • Execute directed upgrades to the continuous monitoring capabilities of the classified and unclassified networks. • Continue to make improvements as required to meet national cyber security standards. • Address critical deficiencies and correct to achieve full system accreditation. • Complete Corrective Action Plans.	• Continue to plan for directed upgrades to the continuous monitoring capabilities of the classified and unclassified networks. • Continue improvements as required to meet national cybersecurity standards. Continue maintenance and operation of the ECN in order to meet the National Security mission requirements and to support the NNSA Network Vision. • Address critical deficiencies and corrections to achieve full system accreditation. • Provide continued maintenance and operation of the network, including recurring IT leasing costs; maintenance and operations contractor personnel to support on-going cybersecurity requirements; and IT infrastructure monitoring services required by NNSA OCIO. • Continue to provide technical assistance to DOE/NNSA sites and improve overall emergency preparedness and response readiness and performance. • Continue to coordinate and chair annual meetings with HQ and field Emergency Management personnel to share lessons learned and new technologies and techniques with the entire DOE/NNSA Complex.	

Nuclear Counterterrorism and Incident Response Program
Counterterrorism Response and Capacity Building

Description

The Counterterrorism Response and Capacity Building subprogram leverages unique technical, operational, and threat expertise to conduct cooperative activities addressing a range of nuclear incidents from terror threats to civil nuclear materials and facilities, global WMD threats, and foreign nuclear or radiological incidents and accidents. The subprogram annually assess global trends in order to develop and prioritize its domestic and international nuclear incident policy support and cooperative activities. Cooperative activities under this subprogram include a suite of training programs, technical exchanges, customized bilateral and multilateral exercises, technical assistance projects and provision of nuclear incident response and emergency management equipment, as needed. These activities directly support U.S. government strategic objectives and international commitments related to weapons of mass destruction counterterrorism and counterproliferation, international nuclear emergency management and incident response, and domestic preparedness and response. By strengthening nuclear incident preparedness and response policies and capabilities domestically and internationally, 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 partner nations to improve nuclear incident response capabilities, including: radiological search training and techniques, protocol development, and provision of detection equipment and expertise to address lost radiological or nuclear materials; communications systems, radiation detection and monitoring equipment, and associated training and techniques for detection of and response to radiological and nuclear 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 support to foreign radiological/nuclear incidents and accidents, as needed. This cooperation has included partnerships with more than 80 countries and 10 international organizations, including the International Atomic Energy Agency (IAEA), European Union (EU), and North Atlantic Treaty Organization (NATO).

- Conducting regular, interagency bilateral exchanges with advanced civil nuclear states facing, like the United States, a shared threat of nuclear terrorism. Classified information-sharing agreements allow for robust, 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 observations.

- Designing, development, and conduct (in collaboration with other U.S. government partners) of domestic *Silent Thunder* site-specific table-top exercises for federal, state and local agencies with security and response functions at locations 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 WMD threat awareness training.

Activities and Explanation of Changes

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs FY 2016
Counterterrorism Response and Capacity Building $7,256,000	**Counterterrorism Response and Capacity Building $7,500,000**	**Counterterrorism Response and Capacity Building +$244,000**
• Engage in cooperation with two additional countries in strengthening their emergency management system. • Develop, design, organize and conduct specialized nuclear incident response and emergency management training courses and programs to meet the specific emergency management needs of partner nations. • Provide enhanced communication and radiation monitoring equipment, search capabilities and training, technical assistance and training IAEA and foreign government emergency programs to address nuclear/radiological incidents. • Support development of a robust and harmonized international management system through conduct of specialized emergency response activities, including developing emergency policy, plans and procedures and radiological search, training, protocols and techniques. • Conduct 8 domestic *Silent Thunder* WMD counterterrorism tabletop exercises, at least 3 foreign *Eminent Discovery* tabletop exercise or WMD threat awareness workshops, and at least two classified Counterterrorism Security Dialogues to address evolving and emerging terrorism threats to nuclear materials and facilities.	• This increase will support performance of additional international training to high priority partners and engage two additional countries in cooperation to strengthen their nuclear emergency preparedness and response capabilities. • Engage in cooperation with two additional countries in strengthening their emergency management system. • Develop, design, organize and conduct specialized nuclear incident response and emergency management training courses and programs to meet the specific emergency management needs of partner nations. • Provide enhanced communication and radiation monitoring equipment, search capabilities and training, technical assistance and training IAEA and foreign government emergency programs to address nuclear/radiological incidents. • Support development of a robust and harmonized international management system through conduct of specialized emergency response activities, including developing emergency policy, plans and procedures and radiological search, training, protocols and techniques. • Conduct 8 domestic *Silent Thunder* WMD counterterrorism tabletop exercises, at least 3 foreign *Eminent Discovery* tabletop exercise or WMD threat awareness workshops, and at least	• This increase will support performance of additional international training to high priority partners and engage two additional countries in cooperation to strengthen their nuclear emergency management systems.

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs FY 2016
	two classified Counterterrorism Security Dialogues to address evolving and emerging terrorism threats to nuclear materials and facilities. **FY 2018-FY 2021** • Develop, design, organize and conduct specialized emergency management training courses and programs to meet the specific emergency management needs of 6 additional/new priority partner nations. • Provide enhanced communication and radiation monitoring equipment, search capabilities and training, technical assistance and training for IAEA and 4 additional/new priority foreign government emergency programs to address nuclear/radiological incidents. • Support development of a robust and harmonized international management system through conduct of specialized emergency response activities, including developing emergency policy, plans and procedures and radiological search, training, protocols and techniques. • Conduct 8 domestic *Silent Thunder* WMD counterterrorism tabletop exercises, at least 4 foreign *Eminent Discovery* tabletop exercise or WMD Threat Awareness workshops, and at least two classified Counterterrorism Security Dialogues to 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 Improvised Nuclear Devices (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, and 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 U.S. government 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.

The majority of this FY 2017 Budget Request will support high-precision threat device modeling and experiments, as well as validation of technologies to model disablement actions for field deployment. NCT Assessment will continue a series of major experiments in support of the Joint Disablement Campaign, an effort coordinated with DOD to develop, model, and validate render safe/render unusable tools, techniques, and procedures to be applied by military and civilian teams against INDs.

In support of national policy objectives and in partnership with DOD, NCT will continue to explore innovative approaches for standoff disablement. NCT Assessment will gather existing experimental and other data, identify information and modeling gaps, and improve 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 Channel collaborations between the United States and the United Kingdom and the United States 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.

Activities and Explanation of Changes

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs FY 2016
Counterterrorism and Counterproliferation Programs $57,789,000 • Increased activities for threat device modeling and experiments, as well as development and testing of render safe tools. • Selected experiments are also planned, meeting key DOD operational needs. • Restart execution of the experimental efforts to build predictive capabilities for Render Safe after minor delays in FY 2014 and suspension of activities in FY 2015. • Execute a full range of standoff disablement experiments and modeling activities. This project includes a wide array of new experimental and complex modelling efforts designed to advise U.S. government policies through scientific and technical insights on a range of contingency options. • Support international collaboration activities through the NTR channels to conduct evaluations of nuclear terrorism risks and scenarios, as well as materials attractiveness studies, including those under the U.S./Japan Nuclear Security Working Group. • Maintain post-detonation device modeling capabilities. • Continue to manage the monitoring, assessment, and response of open source Nuclear Threat Device information.	**Nuclear Counterterrorism Assessment $61,251,000** • Continue FY 2016 activities with additional efforts in support of standoff disablement. **FY 2018-FY 2021** • Continue planned activities for threat device modeling and experiments, as well as development and testing of render safe tools. • Continue execution of the experimental efforts to build predictive capabilities for Render Safe. • Continue to execute innovative standoff disablement exploration activities, with accelerated experimentation continuing through FY 2018.	**Nuclear Counterterrorism Assessment +$3,462,000** • Increased funding is requested to continue supporting standoff disablement activities.

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 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021
Emergency Operations Readiness Index - 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	91 EORI	91 EORI	91 EORI	91 EORI	91 EORI	91 EORI
Result	91						
Endpoint Target	Annually, maintain a Readiness Index of 91 or higher. Note: This target is under assessment resulting from reorganization. Although the Nuclear Incident Team remains under Emergency Operations, the program will reassess its Readiness measure.						
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	11,000 trained personnel	11,700 trained personnel	12,500 trained personnel	13,300 trained personnel	14,000 trained personnel	14,800 trained personnel	N/A
Result	11,000						
Endpoint Target	By the end of FY 2020, train 14,800 officials in WMD CT prevention and response. The Office of Counterterrorism Policy and Cooperation's WMD CT 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-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.							

	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021
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	N/A	35% Complete	50% Complete	70% Complete	85% Complete	100% Complete	N/A
Result	N/A						

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. This experimental series 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.

Nuclear Counterterrorism and Incident Response Program
Capital Summary

(Dollars in Thousands)

	Total	Prior Years	FY 2015 Enacted	FY 2015 Current	FY 2016 Enacted	FY 2017 Request	FY 2017 vs FY 2016 Request
Capital Operating Expenses Summary (including (Major Items of Equipment (MIE)							
Capital Equipment >$500K (including MIE)	N/A	N/A	0	0	0	0	0
Plant Projects (GPP) (<$10M)	N/A	N/A	1,363	1,363	1,393	1,424	+31
Total, Capital Operating Expenses	**N/A**	**N/A**	**1,363**	**1,363**	**1,393**	**1,424**	**+31**
Capital Equipment > $500K (including MIE)							
Total Non-MIE Capital Equipment (>$500K)	N/A	N/A	0	0	0	0	0
Total, Capital Equipment (including MIE)	N/A	N/A	**0**	**0**	**0**	**0**	**0**
Plant Projects (GPP and IGPP) (Total Estimated Cost (TEC) <$10M)							
Total Plant Projects (GPP) (Total Estimated Cost (TEC) <$5M)	N/A	N/A	**1,363**	**1,363**	**1,393**	**1,424**	**+31**
Total, Plant Projects (GPP) (Total Estimated Cost (TEC) <$10M)	N/A	N/A	**1,363**	**1,363**	**1,393**	**1,424**	**+31**
Total, Capital Summary	**N/A**	**N/A**	**1,363**	**1,363**	**1,393**	**1,424**	**+31**

Outyears for Nuclear Counterterrorism and Incident Response Program

(Dollars in Thousands)

	FY 2018 Request	FY 2019 Request	FY 2020 Request	FY 2021 Request
Capital Operating Expenses Summary (including (Major Items of Equipment (MIE)				
Capital Equipment >$500K (including MIE)	0	0	0	0
Plant Projects (GPP) (<$10M)	1,455	1,487	1,520	1,553
Total, Capital Operating Expenses	**1,455**	**1,487**	**1,520**	**1,553**
Capital Equipment > $500K (including MIE)				
Total Non-MIE Capital Equipment (>$500K)	0	0	0	0
Total, Capital Equipment (including MIE)	**0**	**0**	**0**	**0**
Plant Projects (GPP) (Total Estimated Cost (TEC) <$10M)				
Total Plant Projects (GPP) (Total Estimated Cost (TEC) <$5M)	1,455	1,487	1,520	1,553
Total, Plant Projects (GPP) (Total Estimated Cost (TEC) <$10M)	**1,455**	**1,487**	**1,520**	**1,553**
Total, Capital Summary	**1,455**	**1,487**	**1,520**	**1,553**

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($K)

Defense Nuclear Nonproliferation	FY 2015 Current	FY 2016 Enacted	FY 2017 Request
Argonne National Laboratory			
Global Threat Reduction Initiative			
Global Threat Reduction Initiative	28,002	0	0
Nonproliferation and Verification R&D			
Nonproliferation and Verification R&D	0	0	0
Defense Nuclear Nonproliferation R&D			
Defense Nuclear Nonproliferation R&D	2,490	4,072	3,854
Nonproliferation and International Security			
Nonproliferation and International Security	7,800	0	0
International Material Protection and Cooperation			
International Material Protection and Cooperation	330	0	0
Nuclear Counterterrorism and Incident Response			
Nuclear Counterterrorism Incident Response	0	2,764	2,976
Global Material Security			
Global Material Security	0	1,143	785
Material Management and Minimization			
Material Management and Minimization	0	32,560	36,355
Nonproliferation and Arms Control			
Nonproliferation and Arms Control	0	8,657	8,521
Total, Argonne National Laboratory	**38,622**	**49,196**	**52,491**
Brookhaven National Laboratory			
Global Threat Reduction Initiative			
Global Threat Reduction Initiative	919	0	0
Nonproliferation and Verification R&D			
Nonproliferation and Verification R&D	0	0	0
Defense Nuclear Nonproliferation R&D			
Defense Nuclear Nonproliferation R&D	1,585	2,542	2,406
Nonproliferation and International Security			
Nonproliferation and International Security	5,900	0	0
International Material Protection and Cooperation			
International Material Protection and Cooperation	2,360	0	0
Nuclear Counterterrorism and Incident Response			
Nuclear Counterterrorism Incident Response	0	2,670	2,916
Global Material Security			
Global Material Security	0	1,344	1,638
Material Management and Minimization			
Material Management and Minimization	0	703	1,013
Nonproliferation and Arms Control			
Nonproliferation and Arms Control	0	4,067	4,003
Total, Brookhaven National Laboratory	**10,764**	**11,326**	**11,976**

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Defense Nuclear Nonproliferation	FY 2015 Current	FY 2016 Enacted	FY 2017 Request
Consolidated Business Center			
Global Threat Reduction Initiative			
Global Threat Reduction Initiative	503	0	0
Material Management and Minimization			
Material Management and Minimization	0	0	1,000
Total, Consolidated Business Center	**503**	**0**	**1,000**
Idaho National Laboratory			
Global Threat Reduction Initiative			
Global Threat Reduction Initiative	63,822	0	0
Nonproliferation and Verification R&D			
Nonproliferation and Verification R&D	0	0	0
Defense Nuclear Nonproliferation R&D			
Defense Nuclear Nonproliferation R&D	7,495	5,857	5,533
Nonproliferation and International Security			
Nonproliferation and International Security	3,600	0	0
International Material Protection and Cooperation			
International Material Protection and Cooperation	937	0	0
Nuclear Counterterrorism and Incident Response			
Nuclear Counterterrorism Incident Response	0	3,455	3,745
Global Material Security			
Global Material Security	0	4,695	2,675
Material Management and Minimization			
Material Management and Minimization	0	106,643	60,386
Nonproliferation and Arms Control			
Nonproliferation and Arms Control	0	2,475	2,435
Total, Idaho National Laboratory	**75,854**	**123,125**	**74,774**
Idaho Operations Office			
Global Threat Reduction Initiative			
Global Threat Reduction Initiative	20	0	0
Total, Idaho Operations Office	**20**	**0**	**0**
Kansas City National Security Complex (KCNSC)			
Defense Nuclear Nonproliferation R&D			
Defense Nuclear Nonproliferation R&D	14	296	281
Nonproliferation and International Security			
Nonproliferation and International Security	2,400	0	0
Nuclear Counterterrorism and Incident Response			
Nuclear Counterterrorism Incident Response	0	17,972	27,534
Nonproliferation and Arms Control			
Nonproliferation and Arms Control	0	1,684	1,657
Total, Kansas City National Security Complex (KCNSC)	**2,414**	**19,952**	**29,472**

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Defense Nuclear Nonproliferation	FY 2015 Current	FY 2016 Enacted	FY 2017 Request
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	10,317	6,502	6,150
Nonproliferation and International Security			
Nonproliferation and International Security	0	0	0
Total, Lawrence Berkeley National Laboratory	**10,317**	**6,502**	**6,150**
Lawrence Livermore National Laboratory			
Global Threat Reduction Initiative			
Global Threat Reduction Initiative	3,305	0	0
Nonproliferation and Verification R&D			
Nonproliferation and Verification R&D	0	0	0
Defense Nuclear Nonproliferation R&D			
Defense Nuclear Nonproliferation R&D	36,189	34,101	39,747
Nonproliferation and International Security			
Nonproliferation and International Security	21,590	0	0
International Material Protection and Cooperation			
International Material Protection and Cooperation	2,780	0	0
Nuclear Counterterrorism and Incident Response			
Nuclear Counterterrorism Incident Response	0	40,510	44,230
Global Material Security			
Global Material Security	0	10,190	12,793
Nonproliferation and Arms Control			
Nonproliferation and Arms Control	0	18,202	16,537
Total, Lawrence Livermore National Laboratory	**63,864**	**103,003**	**113,307**
Livermore Site Office			
Defense Nuclear Nonproliferation R&D			
Defense Nuclear Nonproliferation R&D	500	0	0
Total, Livermore Site Office	**500**	**0**	**0**

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Defense Nuclear Nonproliferation	FY 2015 Current	FY 2016 Enacted	FY 2017 Request
Los Alamos National Laboratory			
Global Threat Reduction Initiative			
Global Threat Reduction Initiative	22,603	0	0
Nonproliferation and Verification R&D			
Nonproliferation and Verification R&D	0	0	0
Defense Nuclear Nonproliferation R&D			
Defense Nuclear Nonproliferation R&D	92,135	95,711	97,113
Nonproliferation and International Security			
Nonproliferation and International Security	22,900	0	0
International Material Protection and Cooperation			
International Material Protection and Cooperation	3,279	0	0
Fissile Materials Disposition			
Fissile Materials Disposition	25,060	0	0
Nuclear Counterterrorism and Incident Response			
Nuclear Counterterrorism Incident Response	0	40,739	45,667
Global Material Security			
Global Material Security	0	31,860	31,401
Material Management and Minimization			
Material Management and Minimization	0	28,065	49,651
Nonproliferation and Arms Control			
Nonproliferation and Arms Control	0	23,425	22,415
Total, Los Alamos National Laboratory	**165,977**	**219,800**	**246,247**
Nevada National Security Site			
Global Threat Reduction Initiative			
Global Threat Reduction Initiative	3,635	0	0
Nonproliferation and Verification R&D			
Nonproliferation and Verification R&D	0	0	0
Defense Nuclear Nonproliferation R&D			
Defense Nuclear Nonproliferation R&D	67,951	60,056	29,314
Nonproliferation and International Security			
Nonproliferation and International Security	0	0	0
International Material Protection and Cooperation			
International Material Protection and Cooperation	48	0	0
Nuclear Counterterrorism and Incident Response			
Nuclear Counterterrorism Incident Response	0	47,064	46,640
Global Material Security			
Global Material Security	0	2,105	4,669
Nonproliferation and Arms Control			
Nonproliferation and Arms Control	0	600	600
Total, Nevada National Security Site	**71,634**	**109,825**	**81,223**

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($K)

Defense Nuclear Nonproliferation	FY 2015 Current	FY 2016 Enacted	FY 2017 Request
New Brunswick Laboratory			
Nonproliferation and International Security			
Nonproliferation and International Security	675	0	0
International Material Protection and Cooperation			
International Material Protection and Cooperation	100	0	0
Nonproliferation and Arms Control			
Nonproliferation and Arms Control	0	272	267
Total, New Brunswick Laboratory	**775**	**272**	**267**
NNSA Albuquerque Complex			
Global Threat Reduction Initiative			
Global Threat Reduction Initiative	25,270	0	0
Nonproliferation and Verification R&D			
Nonproliferation and Verification R&D	0	0	0
Defense Nuclear Nonproliferation R&D			
Defense Nuclear Nonproliferation R&D	12,102	38,310	36,033
Nonproliferation and International Security			
Nonproliferation and International Security	3,500	0	0
International Material Protection and Cooperation			
International Material Protection and Cooperation	64,552	0	0
Fissile Materials Disposition			
Fissile Materials Disposition	2,674	0	0
Nuclear Counterterrorism and Incident Response			
Nuclear Counterterrorism Incident Response	0	975	5,903
Global Material Security			
Global Material Security	0	54,344	63,699
Material Management and Minimization			
Material Management and Minimization	0	19,755	22,500
Nonproliferation and Arms Control			
Nonproliferation and Arms Control	0	1,645	1,619
Total, NNSA Albuquerque Complex	**108,098**	**115,029**	**129,754**
NNSA Production Office (NPO)			
Nonproliferation and International Security			
Nonproliferation and International Security	825	0	0
Fissile Materials Disposition			
Fissile Materials Disposition	60	0	0
Total, NNSA Production Office (NPO)	**885**	**0**	**0**
NNSA Production Site Office			
Material Management and Minimization			
Material Management and Minimization	0	3,890	4,000
Total, NNSA Production Site Office	**0**	**3,890**	**4,000**

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($K)

Defense Nuclear Nonproliferation	FY 2015 Current	FY 2016 Enacted	FY 2017 Request
Oak Ridge Institute for Science & Education			
Nuclear Counterterrorism and Incident Response			
Nuclear Counterterrorism Incident Response	0	10,510	4,184
Total, Oak Ridge Institute for Science & Education	**0**	**10,510**	**4,184**
Oak Ridge National Laboratory			
Global Threat Reduction Initiative			
Global Threat Reduction Initiative	24,462	0	0
Nonproliferation and Verification R&D			
Nonproliferation and Verification R&D	0	0	0
Defense Nuclear Nonproliferation R&D			
Defense Nuclear Nonproliferation R&D	24,432	21,250	20,104
Nonproliferation and International Security			
Nonproliferation and International Security	21,750	0	0
International Material Protection and Cooperation			
International Material Protection and Cooperation	25,650	0	0
Fissile Materials Disposition			
Fissile Materials Disposition	100	0	0
Nuclear Counterterrorism and Incident Response			
Nuclear Counterterrorism Incident Response	0	3,268	3,706
Global Material Security			
Global Material Security	0	25,443	19,822
Material Management and Minimization			
Material Management and Minimization	0	8,977	10,988
Nonproliferation and Arms Control			
Nonproliferation and Arms Control	0	22,087	21,738
Total, Oak Ridge National Laboratory	**96,394**	**81,025**	**76,358**
Oak Ridge National Laboratory Site Office			
Fissile Materials Disposition			
Fissile Materials Disposition	635	0	0
Total, Oak Ridge National Laboratory Site Office	**635**	**0**	**0**
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	18	16	15
Total, Office of Scientific & Technical Information	**18**	**16**	**15**

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($K)

Defense Nuclear Nonproliferation	FY 2015 Current	FY 2016 Enacted	FY 2017 Request
Pacific Northwest National Laboratory			
Global Threat Reduction Initiative			
Global Threat Reduction Initiative	78,740	0	0
Nonproliferation and Verification R&D			
Nonproliferation and Verification R&D	0	0	0
Defense Nuclear Nonproliferation R&D			
Defense Nuclear Nonproliferation R&D	23,872	22,280	25,571
Nonproliferation and International Security			
Nonproliferation and International Security	20,300	0	0
International Material Protection and Cooperation			
International Material Protection and Cooperation	157,539	0	0
Nuclear Counterterrorism and Incident Response			
Nuclear Counterterrorism Incident Response	0	3,217	3,462
Global Material Security			
Global Material Security	0	223,837	138,251
Material Management and Minimization			
Material Management and Minimization	0	22,977	20,188
Nonproliferation and Arms Control			
Nonproliferation and Arms Control	0	18,613	17,532
Total, Pacific Northwest National Laboratory	**280,451**	**290,924**	**205,004**
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	2,000	2,000
Nonproliferation and International Security			
Nonproliferation and International Security	0	0	0
Nuclear Counterterrorism and Incident Response			
Nuclear Counterterrorism Incident Response	0	1,357	1,441
Material Management and Minimization			
Material Management and Minimization	0	3,468	5,033
Nonproliferation and Arms Control			
Nonproliferation and Arms Control	0	400	394
Total, Pantex Plant	**2,000**	**7,225**	**8,868**
Pantex Site Office			
Fissile Materials Disposition			
Fissile Materials Disposition	3,644	0	0
Total, Pantex Site Office	**3,644**	**0**	**0**

Department Of Energy

FY 2017 Congressional Budget

Funding By Appropriation By Site

($K)

Defense Nuclear Nonproliferation	FY 2015 Current	FY 2016 Enacted	FY 2017 Request
Princeton Plasma Physics Laboratory			
Defense Nuclear Nonproliferation R&D			
Defense Nuclear Nonproliferation R&D	200	0	0
Total, Princeton Plasma Physics Laboratory	**200**	**0**	**0**
Richland Operations Office			
Nuclear Counterterrorism and Incident Response			
Nuclear Counterterrorism Incident Response	0	1,425	6,984
Total, Richland Operations Office	**0**	**1,425**	**6,984**
Sandia National Laboratories			
Global Threat Reduction Initiative			
Global Threat Reduction Initiative	34,526	0	0
Nonproliferation and Verification R&D			
Nonproliferation and Verification R&D	0	0	0
Defense Nuclear Nonproliferation R&D			
Defense Nuclear Nonproliferation R&D	87,071	79,879	82,205
Nonproliferation and International Security			
Nonproliferation and International Security	10,700	0	0
International Material Protection and Cooperation			
International Material Protection and Cooperation	10,167	0	0
Nuclear Counterterrorism and Incident Response			
Nuclear Counterterrorism Incident Response	0	36,317	35,853
Global Material Security			
Global Material Security	0	52,918	52,423
Material Management and Minimization			
Material Management and Minimization	0	727	1,033
Nonproliferation and Arms Control			
Nonproliferation and Arms Control	0	7,671	6,910
Total, Sandia National Laboratories	**142,464**	**177,512**	**178,424**
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	8,056	6,065	5,737
Total, Savannah River National Laboratory	**8,056**	**6,065**	**5,737**

Department Of Energy

FY 2017 Congressional Budget

Funding By Appropriation By Site

($K)

Defense Nuclear Nonproliferation	FY 2015 Current	FY 2016 Enacted	FY 2017 Request
Savannah River Operations Office			
Global Threat Reduction Initiative			
Global Threat Reduction Initiative	10,727	0	0
International Material Protection and Cooperation			
International Material Protection and Cooperation	75	0	0
Fissile Materials Disposition			
Fissile Materials Disposition	337,304	0	0
Global Material Security			
Global Material Security	0	182	0
Material Management and Minimization			
Material Management and Minimization	0	3,824	4,400
Nonproliferation Construction			
Nonproliferation Construction	0	330,000	255,000
Total, Savannah River Operations Office	**348,106**	**334,006**	**259,400**
Savannah River Site			
Global Threat Reduction Initiative			
Global Threat Reduction Initiative	16,227	0	0
Nonproliferation and International Security			
Nonproliferation and International Security	5,500	0	0
Fissile Materials Disposition			
Fissile Materials Disposition	3,000	0	0
Nuclear Counterterrorism and Incident Response			
Nuclear Counterterrorism Incident Response	0	2,110	2,304
Material Management and Minimization			
Material Management and Minimization	0	41,022	80,092
Nonproliferation and Arms Control			
Nonproliferation and Arms Control	0	5,210	5,129
Nonproliferation Construction			
Nonproliferation Construction	0	10,000	15,000
Total, Savannah River Site	**24,727**	**58,342**	**102,525**
Savannah River Site Office			
Fissile Materials Disposition			
Fissile Materials Disposition	30,000	0	0
Total, Savannah River Site Office	**30,000**	**0**	**0**

Department Of Energy

FY 2017 Congressional Budget

Funding By Appropriation By Site

($K)

Defense Nuclear Nonproliferation	FY 2015 Current	FY 2016 Enacted	FY 2017 Request
Washington Headquarters			
Global Threat Reduction Initiative			
Global Threat Reduction Initiative	4,503	0	0
Nonproliferation and Verification R&D			
Nonproliferation and Verification R&D	0	0	0
Defense Nuclear Nonproliferation R&D			
Defense Nuclear Nonproliferation R&D	8,336	39,598	37,210
Nonproliferation and International Security			
Nonproliferation and International Security	13,919	0	0
International Material Protection and Cooperation			
International Material Protection and Cooperation	2,721	0	0
Fissile Materials Disposition			
Fissile Materials Disposition	4,870	0	0
Nuclear Counterterrorism and Incident Response			
Nuclear Counterterrorism Incident Response	0	17,508	31,573
Legacy Contractor Pensions			
Legacy Contractor Pensions	102,909	94,617	83,208
Global Material Security			
Global Material Security	0	10,664	3,011
Material Management and Minimization			
Material Management and Minimization	0	4,312	2,955
Nonproliferation and Arms Control			
Nonproliferation and Arms Control	0	14,422	14,185
Total, Washington Headquarters	**137,258**	**181,121**	**172,142**
Waste Isolation Pilot Plant			
Nuclear Counterterrorism and Incident Response			
Nuclear Counterterrorism Incident Response	0	51	56
Total, Waste Isolation Pilot Plant	**0**	**51**	**56**
Y-12 National Security Complex			
Global Threat Reduction Initiative			
Global Threat Reduction Initiative	13,288	0	0
Nonproliferation and International Security			
Nonproliferation and International Security	0	0	0
International Material Protection and Cooperation			
International Material Protection and Cooperation	69	0	0
Total, Y-12 National Security Complex	**13,357**	**0**	**0**

Department Of Energy

FY 2017 Congressional Budget

Funding By Appropriation By Site

($K)

Defense Nuclear Nonproliferation	FY 2015 Current	FY 2016 Enacted	FY 2017 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	1,545	798	649
Fissile Materials Disposition			
Fissile Materials Disposition	32,653	0	0
Nuclear Counterterrorism and Incident Response			
Nuclear Counterterrorism Incident Response	0	2,478	2,707
Global Material Security			
Global Material Security	0	8,026	5,941
Material Management and Minimization			
Material Management and Minimization	0	39,661	41,500
Nonproliferation and Arms Control			
Nonproliferation and Arms Control	0	773	761
Total, Y-12 Site Office	**34,198**	**51,736**	**51,558**
Total, Defense Nuclear Nonproliferation	**1,671,735**	**1,961,878**	**1,821,916**

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, [$1,375,496,000] *$1,420,120,000* to remain available until expended: *Provided*, that [$42,504,000] *$47,100,000* shall be available until September 30, [2017] *2018* for program direction.

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. 114-92, National Defense Authorization Act for Fiscal Year 2016

Naval Reactors

(Dollars in Thousands)

	FY 2015 Enacted	FY 2015 Current	FY 2016 Enacted	FY 2017 Request
Naval Reactors	1,238,500	1,238,500	1,375,496	1,420,120
Rescission of Prior Year Balances	-4,660	-4,660	0	0
Total Naval Reactors, Net of Rescissions	**1,233,840**	**1,233,840**	**1,375,496**	**1,420,120**

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 of its Strategic Plan goal of Nuclear Security, playing a critical role in meeting DOE's Strategic Objective 7 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 2017 Budget Request

Naval Reactors' request of $1,420,120,000 in fiscal year 2017 is for continued achievement of its core objective of ensuring the safe and reliable operation of the Nation's nuclear fleet.

Major Outyear Priorities and Assumptions

The outyear funding (FY 2018 through FY 2021) for Naval Reactors is $6,695,403,000. Outyear funding supports Naval Reactors' core mission of providing proper maintenance and safety oversight, and addressing emergent operational issues and technology obsolescence for 97 operating reactor plants. This includes 73 submarines, 10 aircraft carriers, and 4 research, development, and training platforms (including the land-based prototypes). Outyear funding also supports Naval Reactors' continued achievement of ongoing new plant design projects, as well as continued achievement of its legacy responsibilities, such as ensuring proper management of naval spent nuclear fuel, prudent recapitalization of aging facilities, and cleanup of environmental liabilities.

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

The Naval Reactors appropriation projected contribution to the DOE WCF for FY 2017 is $3,719,000. 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 2017, for the Bettis and Knolls Laboratories, Naval Reactors' planned DOE-funded qualified contractor pension contribution is $22,500,000 and non-qualified contractor pension contribution is $967,215.

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 $1,057,118 in FY 2017 to support this program.

Naval Reactors
Funding by Congressional Control[a]

(Dollars in Thousands)

	FY 2015 Enacted	FY 2015 Current	FY 2016 Enacted	FY 2017 Request	FY 2017 vs FY 2016
Naval Reactors					
Naval Reactors Operations and Infrastructure	390,000	390,000	445,196	449,682	+4,486
Naval Reactors Development	411,180	411,180	446,896	437,338	-9,558
Ohio Replacement Reactor Systems Development	156,100	156,100	186,800	213,700	+26,900
S8G Prototype Refueling	126,400	126,400	133,000	124,000	-9,000
Program Direction	41,500	41,500	42,504	47,100	+4,596
Construction	113,320	113,320	121,100	148,300	+27,200
Subtotal, Naval Reactors	**1,238,500**	**1,238,500**	**1,375,496**	**1,420,120**	**+44,624**
Rescission of Prior Year Balances	-4,660	-4,660	0	0	0
Total, Naval Reactors	**1,233,840**	**1,233,840**	**1,375,496**	**1,420,120**	**+44,624**

Outyears for Naval Reactors Funding

(Dollars in Thousands)

	FY 2018 Request	FY 2019 Request	FY 2020 Request	FY 2021 Request
Naval Reactors				
Naval Reactors Operations and Infrastructure	468,551	530,093	551,917	599,173
Naval Reactors Development	462,912	505,300	521,800	594,275
Ohio Replacement Reactor Systems Development	156,700	138,000	75,500	64,700
S8G Prototype Refueling	190,000	250,000	215,000	50,000
Program Direction	48,200	49,300	50,500	51,700
Construction	141,388	305,694	363,600	311,100
Subtotal, Naval Reactors	**1,467,751**	**1,778,387**	**1,778,317**	**1,670,948**
Use of Prior Year Balances	0	0	0	0
Rescission of Prior Year Balances	0	0	0	0
Total, Naval Reactors	**1,467,751**	**1,778,387**	**1,778,317**	**1,670,948**

[a] The annual total includes an allocation to NNSA from the Department of Defense's five-year budget plan. The amount included for Naval Reactors is $393,000,000 in FY 2018, $402,000,000 in FY 2019, $410,760,000 in FY 2020 and $418,975,000 in FY 2021.

Naval Reactors Funding

(Dollars in Thousands)

	FY 2015 Enacted	FY 2015 Current	FY 2016 Enacted	FY 2017 Request	FY 2017 vs FY 2016
Naval Reactors					
Naval Reactors Operations and Infrastructure					
Research Reactor Facility Operations & Maintenance	119,279	119,279	138,670	149,390	+10,720
Laboratory Facility Regulation, Compliance, & Protection	87,200	87,200	93,046	92,905	-141
Nuclear Spent Fuel Management	111,100	111,100	133,767	130,215	-3,552
Radiological/Environmental Remediation & Demolition	48,721	48,721	59,168	51,260	-7,908
Capital Equipment	0	0	2,845	2,600	-245
General Plant Projects	23,700	23,700	17,700	23,312	+5,612
Total, Naval Reactors Operations and Infrastructure	**390,000**	**390,000**	**445,196**	**449,682**	**+4,486**
Naval Reactors Development					
Ship Construction & Maintenance Support	62,200	62,200	44,753	39,361	-5,392
Nuclear Reactor Technology	109,580	109,580	128,657	130,026	+1,369
Reactor Systems & Component Technology	162,700	162,700	180,271	188,651	+8,380
Advanced Test Reactor Operations	68,000	68,000	77,200	68,600	-8,600
Capital Equipment	8,700	8,700	16,015	10,700	-5,315
Total, Naval Reactors Development	**411,180**	**411,180**	**446,896**	**437,338**	**-9,558**
S8G Prototype Refueling	114,300	114,300	122,770	123,820	+1,050
Capital Equipment (MIE)	12,100	12,100	3,630	180	-3,450
General Plant Project (GPP)	0	0	6,600	0	-6,600
Total, S8G Prototype Refueling	**126,400**	**126,400**	**133,000**	**124,000**	**-9,000**
***Ohio* -Class Replacement Reactor Systems Development**	**156,100**	**156,100**	**186,800**	**213,700**	**+26,900**
Program Direction	**41,500**	**41,500**	**42,504**	**47,100**	**+4,596**
Construction	**113,320**	**113,320**	**121,100**	**148,300**	**+27,200**
Subtotal, Naval Reactors	**1,238,500**	**1,238,500**	**1,375,496**	**1,420,120**	**+44,624**
Recission of Prior Year Balance	-4,660	-4,660			
Total, Naval Reactors	**1,233,840**	**1,233,840**	**1,375,496**	**1,420,120**	**+44,624**

Outyears for Naval Reactors

(Dollars in Thousands)

Naval Reactors	FY 2018 Request	FY 2019 Request	FY 2020 Request	FY 2021 Request
Naval Reactors Operations and Infrastructure				
Research Reactor Facility Operations & Maintenance	143,633	143,763	153,598	160,090
Laboratory Facility Regulation, Compliance, & Protection	96,564	97,552	101,989	107,480
Nuclear Spent Fuel Management	145,632	165,063	172,498	179,827
Radiological/Environmental Remediation & Demolition	60,322	69,709	95,232	107,001
Capital Equipment	4,500	2,000	2,000	2,000
General Plant Projects	17,900	52,006	26,600	42,775
Total, Naval Reactors Operations and Infrastructure	**468,551**	**530,093**	**551,917**	**599,173**
Naval Reactors Development				
Ship Construction & Maintenance Support	38,625	42,071	43,179	43,495
Nuclear Reactor Technology	140,822	157,200	159,257	193,843
Reactor Systems & Component Technology	200,765	219,129	222,564	267,137
Advanced Test Reactor Operations	70,000	71,400	72,900	74,400
Capital Equipment	12,700	15,500	23,900	15,400
Total, Naval Reactors Development	**462,912**	**505,300**	**521,800**	**594,275**
S8G Prototype Refueling	189,210	250,000	215,000	50,000
Capital Equipment (MIE)	790	0	0	0
General Plant Project (GPP)	0	0	0	0
Total, S8G Prototype Refueling	**190,000**	**250,000**	**215,000**	**50,000**
***Ohio*-Class Replacement Reactor Systems Development**	**156,700**	**138,000**	**75,500**	**64,700**
Program Direction	**48,200**	**49,300**	**50,500**	**51,700**
Construction	**141,388**	**305,694**	**363,600**	**311,100**
Total, Naval Reactors	**1,467,751**	**1,778,387**	**1,778,317**	**1,670,948**

Naval Reactors
Explanation of Major Changes
(Dollars in Thousands)

	FY 2017 vs FY 2016 Enacted
Naval Reactors	
Naval Reactors Operations and Infrastructure: This funding increase (+1%) does not represent a significant programmatic change. Continue to support critical prototype maintenance facility and systems maintenance and regulatory requirements across the Program's 4 sites.	**+4,486**
Naval Reactors Development: This decrease (-2%) does not represent a significant programmatic change. Continue to support unique technologies that are critical to delivering superior U.S. Navy fleet operations.	**-9,558**
S8G Prototype Refueling: This funding decreases (-7%) as major development efforts and designs complete and efforts transition to supporting production and performing analysis needed to support future operation and project execution.	**-9,000**
***Ohio*-Class Replacement Reactor Systems Development:** Reflects an increase (+14%) to support reactor plant system and long lead time component development and production plans. This increase is consistent with the project's planned funding profile.	**+26,900**
Program Direction: This funding increase (+11%) supports an additional 8 full time equivalents, general inflationary increase for personnel and pay related costs and benefits, travel requirements, IT, and maintenance operations.	**+4,596**
Construction: This increase (+22%) is driven by the Engineroom Team Trainer Project.	**+27,200**
Total, Naval Reactors	**+44,624**

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 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021
A1B Reactor Plant Design – Cumulative percentage of completion on the next-generation aircraft carrier reactor plant design.							
Target	100% complete	N/A	N/A	N/A	N/A	N/A	N/A
Result	100						
Endpoint Target	By the end of FY 2015, complete 100% of the design of the reactor plant for the next-generation aircraft carrier.						

S1B Reactor Plant Design – Cumulative percentage of work complete on the *Ohio*-Class Replacement submarine reactor plant design.							
Target	32% complete	43% complete	55% complete	65% complete	74% complete	80% complete	83% complete
Result	34.6						
Endpoint Target	By the end of FY 2027, complete 100% of the *Ohio*-Class Replacement 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.

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 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 2017 Budget Request

The Naval Reactors Program Direction budget reflects general inflationary increase for personnel and pay related costs. Despite recent and planned retirements that have resulted in a loss of NR's engineering experience, in FY 2017 NR will continue to reshape the workforce to manage knowledge transfer to ensure the accomplishment of the NR mission.

FY 2018-FY 2021 Key Milestones

NR plans to continue developing its highly technical workforce to ensure the NR mission is preserved well into the future.

Program Direction
Funding

(Dollars in Thousands)

	FY 2015 Enacted	FY 2015 Current	FY 2016 Enacted	FY 2017 Request	FY 2017 vs FY 2016
Naval Reactors					
Headquarters					
Salaries and Benefits	20,950	20,950	21,300	22,500	+1,200
Travel	100	100	200	1,100	+900
Other Related Expenses	1,980	1,980	2,054	3,300	+1,246
Total, Headquarters	**23,030**	**23,030**	**23,554**	**26,900**	**+3,346**
Naval Reactors Laboratory Field Office					
Salaries and Benefits	16,950	16,950	16,950	17,400	+450
Travel	650	650	800	900	+100
Other Related Expenses	870	870	1,200	1,900	+700
Total, Naval Reactors Laboratory Field Office	**18,470**	**18,470**	**18,950**	**20,200**	**+1,250**
Total Program Direction					
Salaries and Benefits	37,900	37,900	38,250	39,900	+1,650
Travel	750	750	1,000	2,000	+1,000
Other Related Expenses	2,850	2,850	3,254	5,200	+1,946
Total, Program Direction	**41,500**	**41,500**	**42,504**	**47,100**	**+4,596**
Federal FTEs	**238**	**238**	**238**	**246**	**+8**

Other Related Expenses

(Dollars in Thousands)

	FY 2015 Enacted	FY 2015 Current	FY 2016 Enacted	FY 2017 Request	FY 2017 vs FY 2016
Other Related Expenses					
Transportation	350	350	400	830	+430
Communications, Utilities and Miscellaneous Charges	180	180	200	420	+220
Other Services from Federal Sources	410	410	450	680	+230
Advisory and Assistance Services	120	120	150	170	+20
Operation and Maintenance of Facilities	160	160	200	250	+50
Operation and Maintenance of Equipment	310	310	350	650	+300
Supplies and Materials	200	200	220	270	+50
Equipment	400	400	484	1,060	+576
WCF	720	720	800	870	+70
Total, Other Related Expenses	**2,850**	**2,850**	**3,254**	**5,200**	**+1,946**

Outyears Program Direction for Naval Reactors

(Dollars in Thousands)

	FY 2018 Request	FY 2019 Request	FY 2020 Request	FY 2021 Request
Naval Reactors				
Headquarters				
Salaries and Benefits	23,000	23,500	24,000	24,500
Travel	1,100	1,100	1,200	1,200
Other Related Expenses	3,400	3,500	3,600	3,700
Total, Headquarters	**27,500**	**28,100**	**28,800**	**29,400**
Naval Reactors Laboratory Field Office				
Salaries and Benefits	17,900	18,200	18,600	19,000
Travel	900	1,000	1,000	1,100
Other Related Expenses	1,900	2,000	2,100	2,200
Total, Naval Reactors Laboratory Field Office	**20,700**	**21,200**	**21,700**	**22,300**
Total Program Direction				
Salaries and Benefits	40,900	41,700	42,600	43,500
Travel	2,000	2,100	2,200	2,300
Other Related Expenses	5,300	5,500	5,700	5,900
Total, Program Direction	**48,200**	**49,300**	**50,500**	**51,700**
Federal FTEs	**246**	**246**	**246**	**246**

Outyears Other Related Expenses for Naval Reactors

(Dollars in Thousands)

	FY 2018 Request	FY 2019 Request	FY 2020 Request	FY 2021 Request
Other Related Expenses				
Transportation	830	840	860	870
Communications, Utilities and Miscellaneous Charges	430	450	470	480
Other Services from Federal Sources	700	740	780	820
Advisory and Assistance Services	180	190	200	210
Operation and Maintenance of Facilities	260	280	290	300
Operation and Maintenance of Equipment	660	690	700	720
Supplies and Materials	280	300	330	360
Equipment	1,080	1,120	1,170	1,230
WCF	880	890	900	910
Total, Other Related Expenses	**5,300**	**5,500**	**5,700**	**5,900**

Activities and Explanation of Changes

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 Request vs FY 2016 Enacted
Salaries and Benefits $38,250,000	**Salaries and Benefits $39,900,000**	**Salaries and Benefits +$1,650,000**
• Federal salaries and benefits for employees that directly oversee 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 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 FTE's, 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 $5,200,000**	**Other Related Expenses +$1,946,000**
• 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 2015 Enacted	FY 2015 Current	FY 2016 Enacted	FY 2017 Request	FY 2017 vs FY 2016
Capital Operating Expenses Summary (including Major Items of Equipment (MIE))							
Capital Equipment >$500K (including MIE)	N/A	N/A	20,800	20,800	22,490	13,480	-9,010
Plant Projects (GPP and IGPP)	N/A	N/A	23,700	23,700	24,300	23,312	-988
Total, Capital Operating Expenses	**N/A**	**N/A**	**44,500**	**44,500**	**46,790**	**36,792**	**-9,998**
Capital Equipment > $500K (including MIE)							
Total Non-MIE Capital Equipment (>$500K)	N/A	N/A	8,700	8,700	5,860	2,800	-3,060
Laboratory Network Upgrade	8,000	0	0	0	2,000	2,000	+0
High Performance Computer (FY 2016 Buy)	11,000	0	0	0	11,000	0	-11,000
High Performance Computer (FY 2017 Buy)	5,500	0	0	0	0	5,500	+5,500
Land-based Prototype Ringer Crane Replacement	11,000	0	11,000	11,000	0	0	+0
Land-based Prototype Rod Control Equipment	10,500	8,700	0	0	1,800	0	-1,800
Land-Based Prototype Instrumentation and Control	17,900	14,100	1,100	1,100	1,830	180	-1,650
Laser Electron Atom Probe	3,000	0	0	0	0	3,000	+3,000
Total, Capital Equipment (including MIE)	**N/A**	**N/A**	**20,800**	**20,800**	**22,490**	**13,480**	**-9,010**
Plant Projects (GPP and IGPP)							
Total Plant Projects (GPP/IGPP) (Total Estimated Cost (TEC) <$5M)	N/A	N/A	11,850	11,850	11,900	17,662	+5,762
NRF Vehicle Barrier System	6,000	0	350	350	0	5,650	+5,650
KS Crafts Facility	9,000	700	8,300	8,300	0	0	+0
KS Reactor Operations Support Building	9,000	0	3,200	3,200	5,800	0	-5,800
KS Prototype Overhaul Support Facility	6,600	0	0	0	6,600	0	-6,600
Total, Plant Projects (GPP/IGPP)	**N/A**	**N/A**	**23,700**	**23,700**	**24,300**	**23,312**	**-988**
Total, Capital Summary	**N/A**	**N/A**	**44,500**	**44,500**	**46,790**	**36,792**	**-9,998**

Outyears for Naval Reactors

	(Dollars in Thousands)			
	FY 2018 Request	FY 2019 Request	FY 2020 Request	FY 2021 Request
Capital Operating Expenses Summary (including Major Items of Equipment (MIE))				
Capital Equipment >$500K (including MIE)	17,990	17,500	25,900	17,400
Plant Projects (GPP and IGPP)	17,900	52,006	26,600	42,775
Total, Capital Operating Expenses	**35,890**	**69,506**	**52,500**	**60,175**
Capital Equipment > $500K (including MIE)				
Total Non-MIE Capital Equipment (>$500K)	9,700	5,500	13,400	3,300
Laboratory Network Upgrade	2,000	2,000	0	0
NRF Network Upgrade	0	0	2,000	2,000
High Performance Computers (FY 2018 Buy)	5,500	0	0	0
High Performance Computers (FY 2019 Buy)	0	5,500	0	0
High Performance Computers (FY 2020 Buy)	0	0	5,500	0
High Performance Computers (FY 2021 Buy)	0	0	0	5,500
RML Shielded Microprobe Replacement	0	4,500	0	0
RML High Radiation Scanning Electron Microscope Replacement	0	0	5,000	0
Analytical Electrical Microscope	0	0	0	2,200
Land-Based Prototype Instrumentation and Control	790	0	0	0
Full Size Advanced Heat Treatment Furnace	0	0	0	2,400
42 Kilowatt Electron Beam Welder Replacement	0	0	0	2,000
Total, Capital Equipment (including MIE)	**17,990**	**17,500**	**25,900**	**17,400**

Outyears for Naval Reactors

	(Dollars in Thousands)			
	FY 2018 Request	FY 2019 Request	FY 2020 Request	FY 2021 Request
Plant Projects (GPP and IGPP)				
Total Plant Projects (GPP/IGPP) (Total Estimated Cost (TEC) <$5M)	17,600	43,856	14,020	19,275
BL Unclassified Computing Center	0	0	0	380
BL Advanced Concept Test Facility	0	0	0	500
NRF Security Upgrades	300	7,700	0	0
NRF Office Building #3	0	0	350	8,350
KL Crafts Facility	0	0	6,900	0
KL Legacy Eliminating Office Bldg	0	0	0	9,000
KS Building 83 Upgrade	0	0	525	5,270
KS Service Water and Sanitary Sewer Upgrade	0	450	4,805	0
Total, Plant Projects (GPP/IGPP)	**17,900**	**52,006**	**26,600**	**42,775**
Total, Capital Summary	**35,890**	**69,506**	**52,500**	**60,175**

Naval Reactors
Construction Projects Summary

(Dollars in Thousands)

	Total	Prior Years	FY 2015 Enacted	FY 2015 Current	FY 2016 Enacted	FY 2017 Request	FY 2017 vs FY 2016
08-D-190, NRF Expended Core Facility M-290 Receiving/Discharge Station							
Total Estimated Cost (TEC)	65,195	64,795	400	400	0	0	0
Other Project Cost (OPC)	4,423	3,923	500	500	0	0	0
TPC, 08-D-190, Expended Core Facility M-290 Receiving/Discharge Station, NRF	**69,618**	**68,718**	**900**	**900**	**0**	**0**	**0**
10-D-903, KS Security Upgrades							
Total Estimated Cost (TEC)	22,891	2,091	7,400	7,400	500	12,900	+12,400
Other Project Cost (OPC)	2,189	600	0	0	200	361	+161
TPC, 10-D-903, KS Security Upgrades	**25,080**	**2,691**	**7,400**	**7,400**	**700**	**13,261**	**+12,561**
13-D-904, KS Radiological Work and Storage Building							
Total Estimated Cost (TEC)	20,700	600	20,100	20,100	0	0	0
Other Project Cost (OPC)	1,000	400	100	100	400	100	-300
TPC, 13-D-904, KS Radiological Work and Storage Building	**21,700**	**1,000**	**20,200**	**20,200**	**400**	**100**	**-300**
13-D-905, Remote-Handled Low-Level Waste Disposal Project							
Total Estimated Cost (TEC)	35,493	21,073	14,420	14,420	0	0	0
Other Project Cost (OPC)	7,970	2,385	570	570	3,640	1,375	-2,265
TPC, 13-D-905, Remote-Handled Low-Level Waste Disposal Project	**43,463**	**23,458**	**14,990**	**14,990**	**3,640**	**1,375**	**-2,265**
14-D-901, Spent Fuel Handling Recapitalization Project							
Total Estimated Cost (TEC)	1,472,400	0	63,400	63,400	82,100	96,900	+14,800
Other Project Cost (OPC)	174,100	122,300	6,600	6,600	3,900	3,100	-800
TPC, 14-D-901, Spent Fuel Handling Recapitalization Project[a]	**1,646,500**	**122,300**	**70,000**	**70,000**	**86,000**	**100,000**	**+14,000**

[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 2015 Enacted	FY 2015 Current	FY 2016 Enacted	FY 2017 Request	FY 2017 vs FY 2016
14-D-902, KL Materials Characterization Laboratory							
Total Estimated Cost (TEC)	31,000	1,000	0	0	30,000	0	-30,000
Other Project Cost (OPC)	7,282	2,230	2,100	2,100	1,120	150	-970
TPC, 14-D-902, KL Materials Characterization Laboratory	**38,282**	**3,230**	**2,100**	**2,100**	**31,120**	**150**	**-30,970**
15-D-902, KS Engineroom Team Trainer Facility							
Total Estimated Cost (TEC)	36,400	0	0	0	3,100	33,300	+30,200
Other Project Cost (OPC)	2,220	200	700	700	1,020	300	-720
TPC, 15-D-902, KS Engineroom Team Trainer Facility	**38,620**	**200**	**700**	**700**	**4,120**	**33,600**	**+29,480**
15-D-903, KL Fire System Upgrade							
Total Estimated Cost (TEC)	16,200	0	600	600	600	0	-600
Other Project Cost (OPC)	1,200	600	0	0	0	0	0
TPC, 15-D-903, KL Fire System Upgrade	**17,400**	**600**	**600**	**600**	**600**	**0**	**-600**
15-D-904, NRF Overpack Storage Expansion 3							
Total Estimated Cost (TEC)	15,700	0	400	400	900	700	-200
Other Project Cost (OPC)	400	200	50	50	0	0	0
TPC, 15-D-904, NRF Overpack Storage Expansion 3	**16,100**	**200**	**450**	**450**	**900**	**700**	**-200**

Naval Reactors
Construction Projects Summary

(Dollars in Thousands)

	Total	Prior Years	FY 2015 Enacted	FY 2015 Current	FY 2016 Enacted	FY 2017 Request	FY 2017 vs FY 2016
17-D-911, BL Fire System Upgrade							
Total Estimated Cost (TEC)	14,600	0	0	0	0	1,400	+1,400
Other Project Cost (OPC)	1,500	0	700	700	250	250	0
TPC, 17-D-911, BL Fire System Upgrade	**16,100**	**0**	**700**	**700**	**250**	**1,650**	**+1,400**
Total All Construction Projects							
Total Estimated Cost (TEC)	1,730,579	89,559	106,720	106,720	117,200	145,200	+28,000
Other Project Cost (OPC)	202,284	132,838	11,320	11,320	10,530	5,636	-4,894
TPC, All Construction Projects	**1,932,863**	**222,397**	**118,040**	**118,040**	**127,730**	**150,836**	**+23,106**

Outyears to Completion for Naval Reactors

(Dollars in Thousands)

	FY 2018 Request	FY 2019 Request	FY 2020 Request	FY 2021 Request	Outyears to Completion
10-D-903, KS Security Upgrades					
Total Estimated Cost (TEC)	0	0	0	0	0
Other Project Cost (OPC)	350	678	0	0	0
TPC, 10-D-903, KS Security Upgrades	**350**	**678**	**0**	**0**	**0**
14-D-901, Spent Fuel Handling Recapitalization Project					
Total Estimated Cost (TEC)	99,000	284,100	315,300	234,700	296,900
Other Project Cost (OPC)	3,000	2,900	3,700	4,300	24,300
TPC, 14-D-901, Spent Fuel Handling Recapitalization Project	**102,000**	**287,000**	**319,000**	**239,000**	**321,200**
14-D-902, KL Material Characterization Laboratory					
Total Estimated Cost (TEC)	0	0	0	0	0
Other Project Cost (OPC)	1,500	182	0	0	0
TPC, 14-D-902, KL Material Characterization Laboratory	**1,500**	**182**	**0**	**0**	**0**
15-D-903, KL Fire System Upgrade					
Total Estimated Cost (TEC)	15,000	0	0	0	0
Other Project Cost (OPC)	200	400	0	0	0
TPC, 15-D-903, KL Fire System Upgrade	**15,200**	**400**	**0**	**0**	**0**
15-D-904, NRF Overpack Storage Expansion 3					
Total Estimated Cost (TEC)	13,700	0	0	0	0
Other Project Cost (OPC)	0	150	0	0	0
TPC, 15-D-904, NRF Overpack Storage Expansion 3	**13,700**	**150**	**0**	**0**	**0**
17-D-911, BL Fire System Upgrade					
Total Estimated Cost (TEC)	0	13,200	0	0	0
Other Project Cost (OPC)	0	0	0	300	0
TPC, 17-D-911, BL Fire System Upgrade	**0**	**13,200**	**0**	**300**	**0**

Outyears to Completion for Naval Reactors

(Dollars in Thousands)

	FY 2018 Request	FY 2019 Request	FY 2020 Request	FY 2021 Request	Outyears to Completion
18-D-XXX, KS Overhead Piping					
Total Estimated Cost (TEC)	6,688	5,494	20,900	0	0
Other Project Cost (OPC)	4,028	706	869	271	0
TPC, 18-D-XXX, KS Overhead Piping	**10,716**	**6,200**	**21,769**	**271**	**0**
18-D-XXX, KL Fuel Development Laboratory					
Total Estimated Cost (TEC)	1,000	0	23,700	0	0
Other Project Cost (OPC)	100	50	200	400	800
TPC, 18-D-XXX, KL Fuel Development Laboratory	**1,100**	**50**	**23,900**	**400**	**800**
18-D-XXX, BL Component Test Complex					
Total Estimated Cost (TEC)	3,000	0	0	41,300	0
Other Project Cost (OPC)	100	100	0	300	8,300
TPC, 18-D-XXX, BL Component Test Complex	**3,100**	**100**	**0**	**41,600**	**8,300**
21-D-XXX, NRF Medical Science Complex					
Total Estimated Cost (TEC)	0	0	0	30,800	0
Other Project Cost (OPC)	0	240	120	0	840
TPC, 21-D-XXX, NRF Medical Science Complex	**0**	**240**	**120**	**30,800**	**840**
Total All Construction Projects					
Total Estimated Cost (TEC)	138,388	302,794	359,900	306,800	296,900
Other Project Cost (OPC)	9,278	5,406	4,889	5,571	34,240
TPC, All Construction Projects	**147,666**	**308,200**	**364,789**	**312,371**	**331,140**

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 2015 Enacted	FY 2015 Current	FY 2016 Enacted	FY 2017 Request	FY 2017 vs FY 2016
Research and Development (R&D)					
Basic	0	0	0	0	0
Applied	0	0	0	0	0
Development	1,080,680	1,080,680	1,207,606	1,235,028	+27,422
Subtotal, R&D	**1,080,680**	**1,080,680**	**1,207,606**	**1,235,028**	**+27,422**
Equipment	20,800	20,800	22,490	13,480	-9,010
Construction	137,020	137,020	145,400	171,612	26,212
Total, R&D	**1,238,500**	**1,238,500**	**1,375,496**	**1,420,120**	**+44,624**

17-D-911, BL Fire System Upgrade
Bettis Atomic Power Laboratory, West Mifflin, PA
Project is for Design and Construction

1. Significant Changes and Summary

Significant Changes

This Construction Project Data Sheet (CPDS) is new and will 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, which was approved on February 14, 2014, with a Total Project Cost of $16,100 and a CD-4 of 4Q FY 2021.

A Federal Project Director has been assigned to this project and has approved this CPDS. This project upgrades the Bettis Laboratory fire protection system to achieve compliance with National Fire Protection Association code requirements. In FY2017, funds requested for this project will be used for detailed design efforts.

2. 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	2/14/2014	1Q FY 2016	3Q FY 2016	2Q FY 2018	2Q FY 2019	3Q FY 2019	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/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

3. Project Cost History[b]

(Dollars in Thousands)

	TEC, Design	TEC, Construction	TEC, Total	OPC Except D&D	OPC, D&D	OPC, Total	TPC
FY 2017	1,400	13,200	14,600	1,500	N/A	1,500	16,100

[a] Schedules are only estimates and consistent with the high end of the schedule ranges.
[b] Figures are only estimates and consistent with the high end of the cost ranges.

4. Project Scope and Justification

Scope

This project will replace existing Emergency Alert System (EAS) components, interconnecting cabling, and control components to improve system capabilities, improve maintainability, and bring the Bettis Laboratory fire protection system into compliance with National Fire Protection Association (NFPA) code requirements. Planned upgrades include: reduced time delay between alarm actuation and sounding the audible alarm; use of strobe lights for providing visual notification of an alarm; improved location of speakers; and expanded capability to add alarm codes and announcements.

Justification

The primary performance gap in the EAS relates to time delays in processing alarm signals. The time delay experienced between actuation of an alarm signal and the sounding of site-wide audible alarms, currently as much as 90 seconds, exceeds the required maximum delay of 10 seconds required in NFPA 72 (2010).

Current code requires both audible and visual notification of an alarm in the affected area to ensure notification despite hearing impairment. Emergency evacuation announcements are currently made using a code system, which requires occupants to refer to posted signs or carried cards to determine the nature and location of the emergency for which a code is being given. The current EAS does not provide the capability to separate individual building notifications from site-wide notifications, due to single-channel connections. Having the ability to separate individual building notifications from site-wide notifications would permit alarms to remain active in the affected building while site-wide notifications can be silenced and re-engaged as necessary**.**

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.

5. Financial Schedule

(Dollars in Thousands)

	Appropriations	Plan	Obligations	Costs
Total Estimated Cost (TEC)				
Design				
FY 2017	N/A	1,400	N/A	1,400
Total, Design	N/A	1,400	N/A	1,400
Construction				
FY 2019	N/A	13,200	N/A	8,000
FY 2020	N/A	0	N/A	5,200
Total, Construction	N/A	13,200	N/A	13,200
TEC				
FY 2017	1,400	1,400	1,400	1,400
FY 2018	0	0	0	0
FY 2019	13,200	13,200	13,200	8,000
FY 2020	0	0	0	5,200
Total, TEC	14,600	14,600	14,600	14,600
Other Project Cost (OPC)				
OPC except D&D				
FY 2015	700	700	700	700
FY 2016	250	250	250	250
FY 2017	250	250	250	250
FY 2018	0	0	0	0
FY 2019	0	0	0	0
FY 2020	0	0	0	0
FY 2021	300	300	300	300
Total, OPC	1,500	1,500	1,500	1,500
Total Project Cost (TPC)				
FY 2015	700	700	700	700
FY 2016	250	250	250	250
FY 2017	1,650	1,650	1,650	1,650
FY 2018	0	0	0	0
FY 2019	13,200	13,200	13,200	8,000
FY 2020	0	0	0	5,200
FY 2021	300	300	300	300
Total, TPC	16,100	16,100	16,100	16,100

6. Details of Project Cost Estimate

(Dollars in Thousands)

	Current Total Estimate	Previous Total Estimate	Original Validated Baseline
Total Estimated Cost (TEC)			
Design			
Design	1,400	N/A	N/A
Contingency	0	N/A	N/A
Total, Design	1,400	N/A	N/A
Construction			
Construction	10,400	N/A	N/A
Contingency	2,800	N/A	N/A
Total, Construction	13,200	N/A	N/A
Total, TEC	14,600	N/A	N/A
Contingency, TEC	2,800	N/A	N/A
Other Project Cost (OPC)			
OPC except D&D			
Conceptual Planning	200	N/A	N/A
Conceptual Design	600	N/A	N/A
Startup	300	N/A	N/A
Characterization	400	N/A	N/A
Total, OPC except D&D	1,500	N/A	N/A
D&D			
D&D	N/A	N/A	N/A
Total, D&D	N/A	N/A	N/A
Total, OPC	1,500	N/A	N/A
Contingency, OPC	0	N/A	N/A
			N/A
Total, TPC	16,100	N/A	N/A
Total, Contingency	2,800	N/A	N/A

7. Schedule of Appropriation Requests

(Dollars in Thousands)

		Prior Years	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	Outyears	Total
FY 2017	TEC	0	0	1,400	0	13,200	0	0	0	14,600
	OPC	700	250	250	0	0	0	300	0	1,500
	TPC	700	250	1,650	0	13,200	0	300	0	16,100

8. Related Operations and Maintenance Funding Requirements

Not applicable for Design and Construction Projects that have not completed CD-1.

9. Required D&D Information

There is no new area being constructed in this construction project.

10. Acquisition Approach

The procurement strategy being evaluated for this project is Design-Bid-Build due to the uncertainty caused by the large number of interfaces with legacy systems and facilities. Construction is planned to be a fixed price contract.

15-D-904, NRF Overpack Storage Expansion 3
Naval Reactors Facility, Idaho
Project is for Design and Construction

1. Significant Changes and Summary

Significant Changes

This Construction Project Data Sheet (CPDS) is an update of the FY 2016 CPDS and does not include a new start for the budget year. Relocation of the Naval Reactors Facility (NRF) site's perimeter security fence and associated equipment has been deleted from the scope with no change in the estimated cost.

Summary

The most recent DOE O 413.3B approved Critical Decision (CD) is CD-1, Approve Alternative Selection and Cost Range, which was implemented on March 31, 2015, with a Total Project Cost of $16,100 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 nuclear spent fuel management plan is implemented. FY 2017 funds requested for this project will be used for construction efforts.

2. 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 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[b]

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/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

3. Project Cost History[c]

(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] Schedules are only estimates and consistent with the high end of the schedule ranges.
[b] CD milestones changed to better integrate with other planned construction projects at NRF.
[c] Figures are only estimates and consistent with the high end of the cost ranges.

4. 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 nuclear spent 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 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 nuclear spent fuel repository is available. 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 the 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 nuclear spent 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.

5. Financial Schedule

(Dollars in Thousands)

	Appropriations	Plan	Obligations	Costs
Total Estimated Cost (TEC)				
Design				
FY 2015	N/A	400	N/A	132
FY 2016	N/A	900	N/A	1,168
Total, Design	N/A	1,300	N/A	1,300
Construction				
FY 2017	N/A	700	N/A	700
FY 2018	N/A	13,200	N/A	7,700
FY 2019	N/A	0	N/A	6,000
Total, Construction	N/A	14,400	N/A	14,400
TEC				
FY 2015	400	400	400	132
FY 2016	900	900	900	1,168
FY 2017	700	700	700	700
FY 2018	13,700	13,700	13,700	7,700
FY 2019	0	0	0	6,000
Total, TEC	15,700	15,700	15,700	15,700
Other Project Cost (OPC)				
OPC except D&D				
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	150
Total, OPC	400	400	400	400
Total Project Cost (TPC)				
FY 2014	200	200	200	200
FY 2015	450	450	450	450
FY 2016	900	900	900	900
FY 2017	700	700	700	700
FY 2018	13,700	13,700	13,700	7,700
FY 2019	150	150	150	6,150
Total, TPC	16,100	16,100	16,100	16,100

6. Details of Project Cost Estimate

(Dollars in Thousands)

	Current Total Estimate	Previous Total Estimate[a]	Original Validated Baseline
Total Estimated Cost (TEC)			
Design			
Design	1,300	1,300	N/A
Contingency	0	0	N/A
Total, Design	1,300	1,300	N/A
Construction			
Equipment	700	700	N/A
Construction	8,600	8,600	N/A
Contingency	5,100	5,100	N/A
Total, Construction	14,400	14,400	N/A
Total, TEC	15,700	15,700	N/A
Contingency, TEC	5,100	5,100	N/A
Other Project Cost (OPC)			
OPC except D&D			
Conceptual Design	250	250	N/A
Start-up	150	150	N/A
Total, OPC except D&D	400	400	N/A
D&D			
D&D	N/A	N/A	N/A
Total, D&D	N/A	N/A	N/A
Total, OPC	400	400	N/A
Contingency, OPC	0	0	N/A
			N/A
Total, TPC	16,100	16,100	N/A
Total, Contingency	5,100	5,100	N/A

[a] Previous Total Estimate is from the FY 2016 CPDS.

7. Schedule of Appropriation Requests

(Dollars in Thousands)

		Prior Years	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	Outyears	Total
FY 2015	TEC	400	900	700	13,700	0	0	0	0	15,700
	OPC	250	0	0	50	100	0	0	0	400
	TPC	650	900	700	13,750	100	0	0	0	16,100
FY 2016	TEC	400	900	700	13,700	0	0	0	0	15,700
	OPC	250	0	0	0	150	0	0	0	400
	TPC	650	900	700	13,700	150	0	0	0	16,100
FY 2017	TEC	400	900	700	13,700	0	0	0	0	15,700
	OPC	250	0	0	0	150	0	0	0	400
	TPC	650	900	700	13,700	150	0	0	0	16,100

8. 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	N/A	2,883	N/A
Utilities	4	N/A	288	N/A
Maintenance & Repair	8	N/A	576	N/A
Total	52	N/A	3,747	N/A

9. 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 support planned construction.

10. Acquisition Approach

The overpack storage expansion is planned to be acquired using a design-bid-build approach. The design will be performed by an Architectural Engineer. Construction is planned to be a fixed price contract. The approach will be finalized as part of CD-2, Project Performance Baseline.

15-D-902, KS Engineroom Team Trainer Facility
Kesselring Site, West Milton, NY
Project is for Design and Construction

1. Significant Changes and Summary

Significant Changes

This Construction Project Data Sheet (CPDS) is an update of the FY 2016 CPDS and does not include a new start for the budget year. The acquisition strategy has been updated from Design-Bid-Build to Design-Build.

Summary

The most recent DOE O 413.3B approved Critical Decision (CD) is CD-1, Approve Alternative Selection and Cost Range, which was approved on October 2, 2013, with a Total Project Cost of $38,620 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 facility space and infrastructure for installation and operation of the Engineroom Team Trainer (ERTT) and other task trainer simulation equipment supporting training on the Land-based Prototype. FY 2017 funds requested for this project will be used for construction efforts.

2. 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 2015	5/19/2011		4Q FY 2013	4Q FY 2015	2Q FY 2016	4Q FY 2016	1Q FY 2017	3Q FY 2018
FY 2016	5/19/2011	10/2/2013	10/2/2013	4Q FY 2016	1Q FY 2017	2Q FY 2017	4Q FY 2017	1Q FY 2020
FY 2017	5/19/2011	10/2/2013	10/2/2013	3Q FY 2016	2Q FY 2018	3Q FY 2016[b]	4Q FY 2017	1Q FY 2020

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/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

3. Project Cost History [c]

(Dollars in Thousands)

	TEC, Design	TEC, Construction	TEC, Total	OPC Except D&D	OPC, D&D	OPC, Total	TPC
FY 2015	3,000	33,300	36,300	1,900	300	2,200	38,500
FY 2016	2,500	33,900	36,400	1,820	400	2,220	38,620
FY 2017	3,100	33,300	36,400	1,820	400	2,220	38,620

[a] Schedules are only estimates and consistent with the high end of the schedule ranges.
[b] CD milestones and final design date changed due to change of acquisition approach from design-bid-build to design-build.
[c] Figures are estimates and are consistent with the high end of expected cost ranges.

4. Project Scope and Justification

Scope

This project will construct a building to support installation and operational testing of required advanced simulation equipment including the S8G Engineroom Team Trainer (a simulated portion of the Land-based Prototype Engineroom) and task trainer simulation equipment (simulators for specific Land-based Prototype plant equipment). In addition to housing the simulation training equipment, the facility must provide sufficient support space for computer and server equipment required to operate the simulation equipment, engineer and technician offices, student classrooms, and equipment and spare part maintenance and storage areas. Approximately 35,000 square feet will be required. 6,500 square feet will be 90-foot high bay space to house the Engineroom Team Trainer. The remaining spaces will be housed in 28,000 square feet over three stories. Given the large size of the assembled Engineroom Team Trainer (approximately 42 feet in diameter), the high bay area must include the capability to support simulator assembly (e.g., internal bridge crane). This project includes TEC-funded demolition of Buildings 49 and 50.

Justification

Starting in FY 2018, the Naval Nuclear Power Training Program will begin transitioning from four to three critical training platforms. To maintain training program capacity at the Kesselring Site following this transition, advanced training simulation equipment (e.g., the Engineroom Team Trainer and other task trainers) will augment training on the critical training platforms. There is no Kesselring Site facility of sufficient size or infrastructure to house the required simulators that will augment training on the Land-based Prototype, the critical platform located at the Kesselring Site. This project is required to provide facility space and infrastructure for installation and operational testing of the simulators supporting the Land-based Prototype.

Two alternative locations on the Kesselring Site were considered for the construction of this facility: 1) on the Kesselring Site Buildings 49/50 footprint, or 2) on the Kesselring Site Building 73 footprint. The Buildings 49/50 footprint was chosen because it is less costly than the second option. It will require less utility work and will not require significant site restoration or modification, nor replacement facilities for the current capabilities housed therein. It is also more conveniently located to other training facilities on the Kesselring Site.

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.

5. Financial Schedule[a]

(Dollars in Thousands)

	Appropriations	Plan	Obligations	Costs
Total Estimated Cost (TEC)				
Design				
FY 2016	N/A	3,100	N/A	2,500
Total, Design	N/A	3,100	N/A	2,500
Construction				
FY 2017	N/A	33,300	N/A	11,500
FY 2018	N/A	0	N/A	17,500
FY 2019	N/A	0	N/A	4,900
Total, Construction	N/A	33,300	N/A	33,900
TEC				
FY 2016	3,100	3,100	3,100	2,500
FY 2017	33,300	33,300	33,300	11,500
FY 2018	0	0	0	17,500
FY 2019	0	0	0	4,900
Total, TEC	36,400	36,400	36,400	36,400
Other Project Cost (OPC)				
OPC except D&D				
FY 2013	N/A	N/A	N/A	200
FY 2014	N/A	N/A	N/A	0
FY 2015	N/A	N/A	N/A	700
FY 2016	N/A	N/A	N/A	620
FY 2017	N/A	N/A	N/A	300
Total, OPC except D&D	N/A	N/A	N/A	1,820
D&D				
FY 2016	N/A	N/A	N/A	400
Total, D&D	N/A	N/A	N/A	400
Total, OPC				
FY 2013	200	200	200	200
FY 2014	0	0	0	0
FY 2015	700	700	700	700
FY 2016	1,020	1,020	1,020	1,020
FY 2017	300	300	300	300
Total, OPC	2,220	2,220	2,220	2,220
Total Project Cost (TPC)				
FY 2013	200	200	200	200
FY 2014	0	0	0	0
FY 2015	700	700	700	700

[a] Numbers are estimates and are consistent with the high end of expected cost ranges.

(Dollars in Thousands)

	Appropriations	Plan	Obligations	Costs
FY 2016	4,120	4,120	4,120	3,520
FY 2017	33,600	33,600	33,600	11,800
FY 2018	0	0	0	17,500
FY 2019	0	0	0	4,900
Total, TPC	38,620	38,620	38,620	38,620

6. Details of Project Cost Estimate

(Dollars in Thousands)

	Current Total Estimate	Previous Total Estimate[a]	Original Validated Baseline
Total Estimated Cost (TEC)			
Design			
Design	2,800	2,200	N/A
Contingency	300	300	N/A
Total, Design	3,100	2,500	N/A
Construction			
Other Construction	24,800	24,800	N/A
Contingency	8,500	9,100	N/A
Total, Construction	33,300	33,900	N/A
Total, TEC	36,400	36,400	N/A
Contingency, TEC	8,800	9,400	N/A
Other Project Cost (OPC)			
OPC except D&D			
Conceptual Design	420	420	N/A
Temporary Utilities	1,400	1,400	N/A
Total, OPC except D&D	1,820	1,820	N/A
D&D			
D&D	400	400	N/A
Total, D&D	400	400	N/A
Total, OPC	2,220	2,220	N/A
Contingency, OPC	0	0	N/A
Total, TPC	38,620	38,620	N/A
Total Contingency	8,800	9,400	N/A

[a] Previous Total Estimate is from the FY 2016 CPDS.

7. Schedule of Appropriation Requests

(Dollars in Thousands)

		Prior Years	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	Outyears	Total
FY 2015	TEC	1,500	1,500	33,300	0	0	0	0	0	36,300
	OPC	900	1,000	300	0	0	0	0	0	2,200
	TPC	2,400	2,500	33,600	0	0	0	0	0	38,500
FY 2016	TEC	0	3,100	33,300	0	0	0	0	0	36,400
	OPC	900	1,020	300	0	0	0	0	0	2,220
	TPC	900	4,120	33,600	0	0	0	0	0	38,620
FY 2017	TEC	0	3,100	33,300	0	0	0	0	0	36,400
	OPC	900	1,020	300	0	0	0	0	0	2,220
	TPC	900	4,120	33,600	0	0	0	0	0	38,620

8. 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	309	309	12,360	12,360
Maintenance & Repair	309	309	12,360	12,360
Total	618	618	24,720	24,720

9. 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 Kesselring Site	35,000
Area of D&D in this project at the Kesselring Site	12,800
Area at the Kesselring Site 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	12,800

The project will demolish two existing, single-story facilities that are beyond their expected useful life. The D&D is planned for 4Q FY 2016 through 4Q FY 2017. The new facility will be built on the footprint of these buildings, but does not replace their capabilities. The project has no planned offsetting D&D, because it represents a new capability for the Naval Reactors (NR) Program. The 12,800 square feet of D&D related to the existing facilities will be added to the banked area for future NR projects.

Site location, building name or numbers, and square footages of existing facilities to be replaced:

Kesselring Site;	Bldg 49;	6,400 square feet
Kesselring Site;	Bldg 50;	6,400 square feet
		12,800 square feet

10. Acquisition Approach

This Project will be conducted using a Design-Build acquisition strategy. This strategy has changed from the originally planned Design-Bid-Build acquisition strategy, due to not receiving requested FY 2015 funding from Congress. Final design and construction will be under a fixed price contract.

14-D-901, Spent Fuel Handling Recapitalization Project
Naval Reactors Facility, Idaho
Project is for Design and Construction

1. Significant Changes and Summary

Significant Changes
This Construction Project Data Sheet (CPDS) is an update of the FY 2016 CPDS and is not a new start for the budget year.

The Project completed Conceptual Design with Critical Decision – 1 (CD-1) on March 19, 2015. There are no changes to the Total Project Cost or schedule, as the Project continues to progress as planned. The divisions between cost categories have been updated based on progression of project plans and completion of CD-1.

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, was approved on March 19, 2015 with a cost estimate of $1,646,500 (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.

This project will design and construct a new facility 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.

The Spent Fuel Handling Recapitalization Project facility square footage is estimated to be 239,000 square feet. Of this, approximately 78,000 square feet is required for spent fuel shipping container receipt and processing; approximately 35,000 square feet is required for spent fuel water pool preparation and in-process storage; approximately 30,000 square feet is required for spent fuel dry storage preparations and packaging; approximately 67,000 square feet is required for waste management and facility systems operations; and approximately 29,000 square feet is required for staging, warehousing, and administrative office space. Spent fuel handling operations in the existing Expended Core Facility (ECF) 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 ECF will continue for the foreseeable future; therefore, the costs associated with D&D of the ECF are not included in the range of costs cited for the Spent Fuel Handling Recapitalization Project.

2. 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	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[d]	4Q FY 2018	N/A	3Q FY 2025

[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 Revised PDS incorporated the expected impacts of the Consolidated Appropriations Act, 2014 funding reductions.
[d] The Final Design Complete date is an estimate only and will be established in the Performance Baseline at CD-2.

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

	(Fiscal Quarter or Date)		
	CD-3A	CD-3B	CD-4A
FY 2017	2Q FY 2017	1Q FY 2018	3Q FY 2024

CD-3A – Start of Long Lead Material Procurement
CD-3B – Start of Early Site Preparation
CD-4A – Start of M-290 Operations

3. 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	263,000	1,144,900	1,407,000	178,200	N/A	178,200	1,586,100
FY 2016	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

No construction, excluding approved long lead procurement and early site preparation, will be performed until the project performance baseline has been validated and CD-3 has been approved.

4. Project Scope and Justification

Scope

The Spent Fuel Handling Recapitalization Project facility square footage is estimated to be 239,000 square feet. Of this, approximately 78,000 square feet is required for spent fuel shipping container receipt and processing; approximately 35,000 square feet is required for spent fuel water pool preparation and in-process storage; approximately 30,000 square feet is required for spent fuel dry storage preparations and packaging; approximately 67,000 square feet is required for waste management and facility systems operations; and approximately 29,000 square feet is required for staging, warehousing, and administrative office space.

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.
- Conduct personnel training and develop training programs, where appropriate.

[a] Figures are only estimates and consistent with the high end of the cost ranges.
[b] Divisions between cost categories have been updated based on progression of Project plans and CD-1 completion.

- 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 NR is to provide the nation with militarily effective nuclear propulsion plants and to ensure their safe, reliable, long-lived, and affordable operation. NR 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, NR 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 (NRF) at the Idaho National Laboratory (INL).

The Expended Core Facility (ECF), located at the NRF 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 ECF continues to be maintained and operated in a safe and environmentally responsible manner, the existing infrastructure and equipment is over 55 years old, does not meet current standards, and requires recapitalization. ECF 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 pose substantial risk to the continued processing of naval spent nuclear fuel for long term storage. An interruption of refueling and defueling schedules for nuclear-powered vessels, as required by existing maintenance schedules, would adversely affect the operational availability of the nuclear fleet. If this interruption were to extend over long periods, the ability to sustain fleet operations would be impacted, resulting ultimately in a significant decrement to the Navy's responsiveness and agility to fulfull military missions worldwide.

Actions necessary to continue NR's ability to support naval spent nuclear fuel handling are the subject of an Environmental Impact Statement (EIS). The EIS for recapitalization of the infrastructure supporting naval spent nuclear fuel will include an assessment of the environmental impacts associated with handling of naval spent nuclear fuel. The Draft EIS was published in June 2015. The EIS will evaluate the environmental impacts of the following alternatives:

(1) No Action Alternative – Maintain the naval spent nuclear fuel handling capabilities of the ECF by continuing to use the current ECF infrastructure while performing corrective maintenance and repairs.
(2) Overhaul Alternative – Recapitalize the naval spent nuclear fuel handling capabilities of ECF by overhauling ECF with major refurbishment projects for the ECF infrastructure and water pools.
(3) New Facility Alternative, including the Spent Fuel Handling Recapitalization Project – Recapitalize the naval spent nuclear fuel handling capabilities of ECF by constructing and operating a new facility at one of two potential locations at NRF.

The existing ECF at NRF in Idaho is a single facility that is approximately 197,000 square feet. However, other facilities at NRF support operations within the ECF and include additional areas for administrative support and warehouse storage. ECF has two major capabilities: (1) to receive, unload, prepare, and package naval spent nuclear fuel and, (2) to conduct naval spent nuclear fuel examinations. Both capabilities currently exist within the ECF, which is over 55 years old, does not meet current standards, and requires recapitalization.

The Spent Fuel Handling Recapitalization Project is in the preliminary design phase; therefore, the facility design is subject to change until plans are final. Currently, the Spent Fuel Handling Recapitalization Project facility is conservatively estimated to have a footprint of approximately 239,000 square feet. This new facility will incorporate the capabilities for naval spent nuclear fuel handling that currently exist in the 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 ECF, to handle full length aircraft carrier naval spent nuclear fuel received in new M-290 shipping containers.

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 NR Implementation Bulletin for DOE O 413.3B, and appropriate project management requirements have been met. Prior to

CD-2 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.

5. Financial Schedule[a]

	(Dollars in Thousands)			
	Appropriations	Plan	Obligations	Costs[b]
Total Estimated Cost (TEC)				
Design				
FY 2015	N/A	63,400	63,400	21,287
FY 2016	N/A	82,100	82,100	64,413
FY 2017	N/A	91,400	91,400	83,400
FY 2018	N/A	2,900	2,900	70,700
Total, Design	N/A	239,800	239,800	239,800
Construction				
FY 2017	N/A	5,500	5,500	5,500
FY 2018	N/A	96,100	96,100	74,900
FY 2019	N/A	284,100	284,100	303,400
FY 2020	N/A	315,300	315,300	316,500
FY 2021	N/A	234,700	237,300	235,400
FY 2022	N/A	186,700	186,700	185,900
FY 2023	N/A	57,300	57,300	57,300
FY 2024	N/A	29,300	29,300	30,100
FY 2025	N/A	23,600	23,600	23,600
Total, Construction	N/A	1,232,600	1,232,600	1,232,600
TEC				
FY 2015	63,400	63,400	63,400	21,287
FY 2016	82,100	82,100	82,100	64,413
FY 2017[c]	96,900	96,900	96,900	88,900
FY 2018[c]	99,000	99,000	99,000	145,600
FY 2019	284,100	284,100	284,100	303,400
FY 2020	315,300	315,300	315,300	316,500
FY 2021	234,700	234,700	234,700	235,400
FY 2022	186,700	186,700	186,700	185,900
FY 2023	57,300	57,300	57,300	57,300
FY 2024	29,300	29,300	29,300	30,100
FY 2025	23,600	23,600	23,600	23,600
Total, TEC	1,472,400	1,472,400	1,472,400	1,472,400

[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 and completion of CD-1.

[b] Costs are updated to reflect notional spending plan based on receipt of Major Construction Project funding.

[c] Includes long lead material and site preparation.

	(Dollars in Thousands)			
	Appropriations	Plan	Obligations	Costs[a]
Other Project Cost (OPC)				
OPC except D&D				
FY 2010	6,600	6,600	6,600	6,600
FY 2011	36,100	36,100	36,100	36,100
FY 2012	25,200	25,200	25,200	25,200
FY 2013	29,000	29,000	29,000	29,000
FY 2014	25,400	25,400	25,400	25,400
FY 2015	6,600	6,600	6,600	6,600
FY 2016	3,900	3,900	3,900	3,800
FY 2017	3,100	3,100	3,100	3,000
FY 2018	3,000	3,000	3,000	3,000
FY 2019	2,900	2,900	2,900	2,800
FY 2020	3,700	3,700	3,700	3,600
FY 2021	4,300	4,300	4,300	4,700
FY 2022	6,300	6,300	6,300	6,200
FY 2023	4,400	4,400	4,400	4,500
FY 2024	3,600	3,600	3,600	3,600
FY 2025	6,200	6,200	6,200	6,000
FY 2026	3,800	3,800	3,800	4,000
Total, OPC except D&D	174,100	174,100	174,100	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	6,600
FY 2011	36,100	36,100	36,100	36,100
FY 2012	25,200	25,200	25,200	25,200
FY 2013	29,000	29,000	29,000	29,000
FY 2014	25,400	25,400	25,400	25,400
FY 2015	6,600	6,600	6,600	6,600
FY 2016	3,900	3,900	3,900	3,800
FY 2017	3,100	3,100	3,100	3,000
FY 2018	3,000	3,000	3,000	3,000
FY 2019	2,900	2,900	2,900	2,800
FY 2020	3,700	3,700	3,700	3,600
FY 2021	4,300	4,300	4,300	4,700
FY 2022	6,300	6,300	6,300	6,200
FY 2023	4,400	4,400	4,400	4,500
FY 2024	3,600	3,600	3,600	3,600
FY 2025	6,200	6,200	6,200	6,000
FY 2026	3,800	3,800	3,800	4,000
Total, OPC	174,100	174,100	174,100	174,100

[a] Costs are updated to reflect notional spending plan based on receipt of Major Construction Project funding.

(Dollars in Thousands)

	Appropriations	Plan	Obligations	Costs[a]
Total Project Cost (TPC)				
FY 2010	6,600	6,600	6,600	6,600
FY 2011	36,100	36,100	36,100	36,100
FY 2012	25,200	25,200	25,200	25,200
FY 2013	29,000	29,000	29,000	29,000
FY 2014	25,400	25,400	25,400	25,400
FY 2015	70,000	70,000	70,000	31,500
FY 2016	86,000	86,000	86,000	64,600
FY 2017	100,000	100,000	100,000	91,900
FY 2018	102,000	102,000	102,000	148,600
FY 2019	287,000	287,000	287,000	306,200
FY 2020	319,000	319,000	319,000	320,100
FY 2021	239,000	239,000	239,000	240,100
FY 2022	193,000	193,000	193,000	192,100
FY 2023	61,700	61,700	61,700	61,800
FY 2024	32,900	32,900	32,900	33,700
FY 2025	29,800	29,800	29,800	29,600
FY 2026	3,800	3,800	3,800	4,000
Total, TPC	1,646,500	1,646,500	1,646,500	1,646,500

[a] Costs are updated to reflect notional spending plan based on receipt of Major Construction Project funding.

6. Details of Project Cost Estimate[a]

(Dollars in Thousands)

	Current Total Estimate[b]	Previous Total Estimate[c]	Original Validated Baseline
Total Estimated Cost (TEC)			
Design			
Design	217,290	213,316	N/A
Contingency	22,510	55,484	N/A
Total, Design	239,800	268,800	N/A
Construction			
Site Preparation	51,400	15,900	N/A
Spent Fuel Handling Equipment	318,730	314,755	N/A
Facility Construction	606,748	629,509	N/A
Contingency	255,722	221,936	N/A
Total, Construction	1,232,600	1,182,100	N/A
Total, TEC	1,472,400	1,450,900	N/A
Contingency, TEC	278,232	277,420	N/A
Other Project Cost (OPC)			
OPC except D&D			
Conceptual Planning	42,700	42,700	N/A
Conceptual Design	86,621	86,300	N/A
Start-up	19,780	29,419	N/A
Other (e.g., EIS, Design Reviews)	8,231	19,613	N/A
Contingency	16,768	17,568	N/A
Total, OPC except D&D	174,100	195,600	N/A
D&D	0	0	N/A
Total, D&D	0	0	N/A
Total, OPC	174,100	195,600	N/A
Contingency, OPC	16,768	17,568	N/A
Total, TPC	1,646,500	1,646,500	N/A
Total, Contingency	295,000	294,988	N/A

[a] Figures are only estimates and consistent with the high end of the cost ranges.

[b] Estimate updated within Total Project Cost based on progression of Project plans and completion of CD-1.

[c] Previous Total Estimate is from the FY 2016 PDS.

7. Schedule of Appropriation Requests

(Dollars in Thousands)

		Prior Years	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	Outyears	Total
FY 2014	TEC	186,500	182,900	308,200	226,700	134,900	132,300	64,300	50,700	1,286,500
	OPC	125,000	2,100	1,800	3,300	5,100	7,700	10,700	9,300	165,000
	TPC	311,500	185,000	310,000	230,000	140,000	140,000	75,000	60,000	1,451,500
FY 2015	TEC	186,500	182,900	308,200	226,700	134,900	132,300	64,300	50,700	1,286,500
	OPC	125,000	2,100	1,800	3,300	5,100	7,700	10,700	9,300	165,000
	TPC	311,500	185,000	310,000	230,000	140,000	140,000	75,000	60,000	1,451,500
FY 2015 Rev	TEC	141,100	57,400	64,500	268,100	293,500	265,600	197,900	119,800	1,407,900
	OPC	125,400	2,900	3,300	3,300	4,500	4,500	6,500	27,800	178,200
	TPC	204,400	60,300	67,800	271,400	298,000	270,100	204,400	147,600	1,586,100
FY 2016	TEC	59,700	79,900	96,300	98,600	283,300	313,700	234,300	285,100	1,450,900
	OPC	131,800	6,100	3,700	3,400	3,700	5,300	4,700	36,900	195,600
	TPC	191,500	86,000	100,000	102,000	287,000	319,000	239,000	322,000	1,646,500
FY 2017[a]	TEC	63,400	82,100	96,900	99,000	284,100	315,300	234,700	296,900	1,472,400
	OPC	128,900	3,900	3,100	3,000	2,900	3,700	4,300	24,300	174,100
	TPC[a]	192,300	86,000	100,000	102,000	287,000	319,000	239,000	321,200	1,646,500

8. 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	N/A	6,278,490	N/A
Utilities	1,430	N/A	57,050	N/A
Maintenance & Repair	8,000	N/A	320,130	N/A
Total	166,390	N/A	6,655,670	N/A

[a] 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.

9. 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	239,000[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 ECF 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 ECF will continue for the foreseeable future; therefore, no D&D is planned at this time. Separate NEPA action will be taken to address these future actions, if necessary.

10. Acquisition Approach

The integrated Management & Operating (M&O) prime partners will plan and execute the 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-3.

[a] Facility area is a conservative estimate and subject to change based on preliminary design.

10-D-903, KS Security Upgrades
Kesselring Site, West Milton, NY
Project is for Design and Construction

1. Significant Changes and Summary

Significant Changes

This Construction Project Data Sheet (CPDS) is an update of the FY 2016 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-3, Approve Start of Construction, which was approved on April 10, 2012, with a Total Project Cost of $24,188 and a CD-4 of 4Q FY 2016. The latest approved baseline change was on March 28, 2014 with a TEC of $22,891.

A Federal Project Director has been assigned to this project and has approved this CPDS. This project constructs a new, 8,112 square foot site entrance building and replaces and upgrades security related infrastructure at the Kesselring Site. FY 2017 funds requested for this project will be used to complete construction efforts.

2. 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 2010	4/22/2008		2Q FY 2009	TBD	2Q FY 2013	TBD	TBD	TBD
FY 2011	4/22/2008		4Q FY 2009	TBD	4Q FY 2012	TBD	TBD	TBD
FY 2012	4/22/2008		8/13/2010	TBD	4Q FY 2012	TBD	TBD	TBD
FY 2013 PB	4/22/2008		8/13/2010	8/01/2011	2Q FY 2012	2Q FY 2012	2Q FY 2017	4Q FY 2016
FY 2015	4/22/2008		8/13/2010	8/01/2011	3Q FY 2014	4/10/2012	1Q FY 2014	4Q FY 2019
FY 2016	4/22/2008	8/13/2010	8/13/2010	8/01/2011	4Q FY 2014	4/10/2012	3Q FY 2020	4Q FY 2019
FY 2017	4/22/2008	8/13/2010	8/13/2010	8/01/2011	3Q FY 2016[a]	4/10/2012	3Q FY 2020	4Q FY 2019

CD-0 – Approve Mission Need
Conceptual Design Complete – Actual date the conceptual design was completed
CD-1 – Approve Alternative Selection of 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] FY 2014 efforts completed final design of the perimeter fence for FY 2015. New Final Design Complete date reflects review and update of design supporting FY 2017 site entrance building construction efforts.

3. Project Cost History

(Dollars in Thousands)

	TEC, Design	TEC, Construction	TEC, Total	OPC, Except D&D	OPC, D&D	OPC, Total	TPC
FY 2010	2,000	TBD	TBD	400	TBD	TBD	TBD
FY 2011	2,000	TBD	TBD	300	TBD	TBD	TBD
FY 2012	2,000	TBD	TBD	400	TBD	TBD	TBD
FY 2013 PB	1,999	19,000	20,999	1,672	1,300	2,972	23,971
FY 2015[a]	1,999	20,892	22,891	1,861	1,328	3,189	26,080
FY 2016	2,091	20,800	22,891	1,861	328[b]	2,189	25,080
FY 2017	2,091	20,800	22,891	1,861	328	2,189	25,080

4. Project Scope and Justification

Scope

This project constructs a new, 8,112 square foot site entrance building and replaces and upgrades security related infrastructure at the Kesselring Site due to the advanced age and level of degradation of the currently installed security systems. The project will upgrade the security perimeter, perimeter lighting system, alarm system, and replace the site entrance building. The project also includes demolition of the existing site entrance building after benefical occupancy of the replacement facility.

Justification

The Kesselring Site provides mission critical support to the Naval Reactors program. Effective site security is necessary in support of this mission and for the protection of employees, equipment, and national security. Security protection strategies, equipment, and facilities are intended to deter, detect assess, delay, respond to, and neutralize adversary intrusion or other malevolent acts. An up-to-date and reliable security perimeter system is a key element of these security strategies. The Kesselring Site Security Upgrades project will replace and upgrade security related infrastructure at the Kesselring Site including the site entrance building and portions of the site perimeter fence.

Several alternative configurations were considered for the site area entrance point and the site perimeter fence upgrades. The alternatives for the site area entrance point configuration included multiple locations for the new site entrance building and new locations for the main vehicle entrance gate. The alternative chosen was to build the new site entrance building directly adjacent to the current entrance facility and to maintain the vehicle entrance gate at its current location. This option provided the best balance of cost and personnel processing efficiency while meeting security requirements. The chosen site perimeter fence configuration provides the most cost-effective option that meets security requirements, while minimizing the total soil disturbance area and parking impacts.

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 NR Implementation Bulletin for DOE O 413.3B, and appropriate project management requirements have been met.

[a] Full funding was requested in FY 2013 but not received pursuant to the Consolidated and Further Continuing Appropriations Act, 2013 (Public Law 113-6). Because the project was reprofiled into FY 2015 and beyond, no FY 2014 CPDS was submitted.

[b] FY 2013 D&D efforts of $1,000K were used for remediation and hazardous material removal in Building 2 prior to the expected receipt of FY 2013 investment funds for final demolition as part of the construction subcontract. When full FY 2013 investment funding was not received pursuant to the Consolidated and Further Continuing Appropriations Act, 2013 (Public Law 113-6), investment funding was reprofiled into FY 2015 and beyond. Due to the physical condition of Building 2 after remediation and the expected delay to investment funds, Naval Reactors determined that it was most appropriate to complete demolition of the building to ensure the area was in a safe condition. The remediation and demolition was funded as part of the program's ongoing D&D efforts and removed from the scope of the project.

5. Financial Schedule

(Dollars in Thousands)

	Appropriations	Plan	Obligations	Costs
Total Estimated Cost (TEC)				
Design				
FY 2010	N/A	1,500	N/A	5
FY 2011	N/A	399	N/A	864
FY 2012	N/A	100	N/A	1,026
FY 2013	N/A	92	N/A	46
FY 2014	N/A	0	N/A	150
Total, Design	N/A	2,091	N/A	2,091
Construction				
FY 2015	N/A	7,400	N/A	1,477
FY 2016	N/A	500	N/A	3,857
FY 2017	N/A	12,900	N/A	4,781
FY 2018	N/A	0	N/A	4,454
FY 2019	N/A	0	N/A	4,091
FY 2020	N/A	0	N/A	2,140
Total, Construction	N/A	20,800	N/A	20,800
TEC				
FY 2010	1,500	1,500	1,500	5
FY 2011	399	399	399	864
FY 2012	100	100	100	1,026
FY 2013	92	92	92	46
FY 2014	0	0	0	150
FY 2015	7,400	7,400	7,400	1,477
FY 2016	500	500	500	3,857
FY 2017	12,900	12,900	12,900	4,781
FY 2018	0	0	0	4,454
FY 2019	0	0	0	4,091
FY 2020	0	0	0	2,140
Total, TEC	22,891	22,891	22,891	22,891
Other Project Cost (OPC)				
OPC except D&D				
FY 2008	N/A	N/A	N/A	300
FY 2009	N/A	N/A	N/A	0
FY 2010	N/A	N/A	N/A	100
FY 2011	N/A	N/A	N/A	0
FY 2012	N/A	N/A	N/A	200
FY 2013	N/A	N/A	N/A	0
FY 2014	N/A	N/A	N/A	0
FY 2015	N/A	N/A	N/A	0
FY 2016	N/A	N/A	N/A	200
FY 2017	N/A	N/A	N/A	361
FY 2018	N/A	N/A	N/A	350
FY 2019	N/A	N/A	N/A	350
Total, OPC except D&D	N/A	N/A	N/A	1,861

	(Dollars in Thousands)			
	Appropriations	Plan	Obligations	Costs
D&D				
FY 2019	N/A	N/A	N/A	328
Total, D&D	N/A	N/A	N/A	328
OPC				
FY 2008	300	300	300	300
FY 2009	0	0	0	0
FY 2010	100	100	100	100
FY 2011	0	0	0	0
FY 2012	200	200	200	200
FY 2013	0	0	0	0
FY 2014	0	0	0	0
FY 2015	0	0	0	0
FY 2016	200	200	200	200
FY 2017	361	361	361	361
FY 2018	350	350	350	350
FY 2019	678	678	678	678
Total OPC	2,189	2,189	2,189	2,189
Total Project Cost (TPC)				
FY 2008	300	300	300	300
FY 2009	0	0	0	0
FY 2010	1,600	1,600	1,600	105
FY 2011	399	399	399	864
FY 2012	300	300	300	1,226
FY 2013	92	92	92	46
FY 2014	0	0	0	150
FY 2015	7,400	7,400	7,400	1,477
FY 2016	700	700	700	4,057
FY 2017	13,261	13,261	13,261	5,142
FY 2018	350	350	350	4,804
FY 2019	678	678	678	4,769
FY 2020	0	0	0	2,140
Total, TPC	25,080	25,080	25,080	25,080

6. Details of Project Cost Estimate

(Dollars in Thousands)

	Current Total Estimate	Previous Total Estimate[a]	Original Validated Baseline
Total Estimated Cost (TEC)			
Design			
Design	2,091	2,091	1,850
Contingency	0	0	149
Total, Design	2,091	2,091	1,999
Construction			
Equipment	85	85	85
Construction	19,007	19,007	16,088
Contingency	1,708	1,708	2,827
Total, Construction	20,800	20,800	19,000
Total, TEC	22,891	22,891	20,999
Contingency, TEC	1,708	1,708	2,976
Other Project Cost (OPC)			
OPC except D&D			
Conceptual Design	600	600	372
Start-up	537	537	765
Contingency	724	724	535
Total, OPC except D&D	1,861	1,861	1,672
D&D			
D&D	296	296	1,230
Contingency	32	32	70
Total, D&D	328	328	1,300
Total, OPC	2,189	2,189	2,972
Contingency, OPC	756	756	605
Total, TPC	25,080	25,080	23,971
Total, Contingency	2,464	2,464	3,581

[a] Previous Total Estimate is from the FY 2016 CPDS.

7. Schedule of Appropriation Requests

(Dollars in Thousands)

		Prior Years	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	Outyears	Total
FY 2010	TEC	2,000	0	0	0	0	0	0	0	2,000
	OPC	400	0	0	0	0	0	0	0	400
	TPC	2,400	0	0	0	0	0	0	0	2,400
FY 2011	TEC	2,000	0	0	0	0	0	0	0	2,000
	OPC	300	0	0	0	0	0	0	0	300
	TPC	2,300	0	0	0	0	0	0	0	2,300
FY 2012	TEC	2,000	0	0	0	0	0	0	0	2,000
	OPC	400	0	0	0	0	0	0	0	400
	TPC	2,400	0	0	0	0	0	0	0	2,400
FY 2013 PB	TEC	20,999	0	0	0	0	0	0	0	20,999
	OPC	2,572	400	0	0	0	0	0	0	2,972
	TPC	23,571	400	0	0	0	0	0	0	23,971
FY 2015[a]	TEC	9,491	500	12,900	0	0	0	0	0	22,891
	OPC	1,928	200	361	350	350	0	0	0	3,189
	TPC	11,419	700	13,261	350	350	0	0	0	26,080
FY 2016	TEC	9,491	500	12,900	0	0	0	0	0	22,891
	OPC	600[b]	200	361	350	678	0	0	0	2,189
	TPC	10,091	700	13,261	350	678	0	0	0	25,080
FY 2017	TEC	9,491	500	12,900	0	0	0	0	0	22,891
	OPC	600	200	361	350	678	0	0	0	2,189
	TPC	10,091	700	13,261	350	678	0	0	0	25,080

8. 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	239	96	4,770	3,850
Maintenance & Repair	128	96	3,133	3,850
Total	367	192	7,903	7,700

[a] Full funding was requested in FY 2013 but not received pursuant to the Consolidated and Further Continuing Appropriations Act, 2013 (Public Law 113-6). Final FY 2013 appropriations for this project were $92K, reflecting both full-year Continuing Resolution and Sequestration reductions. Funds were applied to project redesign efforts due to need to reprofile. Because the project was reprofiled into FY 2015 and beyond, no FY 2014 CPDS was submitted.

[b] Profile was adjusted to reflect removal of D&D scope from the project. OPC-funded demolition of existing site entrance building was reprofiled into FY 2019.

[c] Costs updated to include operations and maintenance for the new perimeter fence and associated security systems.

9. D&D Information

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

	Square Feet
New area being constructed by this project at the Kesselring Site	8,112
Area of D&D in this project at the Kesselring Site	5,285
Area at the Kesselring Site to be transferred, sold, and/or D&D outside the project including area previously "banked"	2,827
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	8,112

The project will D&D Building 1 on the Kesselring site. The D&D is expected to occur between 1Q FY 2020 and 3Q FY 2020, after the new site entrance building takes beneficial occupancy.

Names and site locations of existing facilities to be D&D by this project:

Kesselring Site;	Building 1;	5,285 square feet
		5,285 square feet

10. Acquisition Approach

Design has been contracted via a cost plus fixed fee contract with the A/E. Separate construction contracts will be awarded for construction of the site entrance building and perimeter security upgrades. The construction contracts will be design-bid-build and fixed price contracts.

Department Of Energy

FY 2017 Congressional Budget

Funding By Appropriation By Site

($K)

Naval Reactors	FY 2015 Current	FY 2016 Enacted	FY 2017 Request
Bettis Atomic Power Laboratory			
Naval Reactors Program			
Naval Reactors Program	465,370	485,696	513,287
Total, Bettis Atomic Power Laboratory	**465,370**	**485,696**	**513,287**
Idaho National Laboratory			
Naval Reactors Program			
Naval Reactors Program	131,460	148,115	150,976
Total, Idaho National Laboratory	**131,460**	**148,115**	**150,976**
Knolls Atomic Power Laboratory			
Naval Reactors Program			
Naval Reactors Program	515,380	596,959	605,118
Total, Knolls Atomic Power Laboratory	**515,380**	**596,959**	**605,118**
Naval Research Laboratory			
Program Direction			
Program Direction	18,470	18,950	20,200
Total, Naval Research Laboratory	**18,470**	**18,950**	**20,200**
Washington Headquarters			
Naval Reactors Program			
Naval Reactors Program	84,790	102,222	103,639
Program Direction			
Program Direction	23,030	23,554	26,900
Total, Washington Headquarters	**107,820**	**125,776**	**130,539**
Total, Naval Reactors	**1,238,500**	**1,375,496**	**1,420,120**

GENERAL PROVISIONS—DEPARTMENT OF ENERGY
(INCLUDING TRANSFER [AND RESCISSIONS] 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 **[**described in section 4 (in the matter preceding division A of this consolidated**]** *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 **[**2016**]** *2017* until the enactment of the Intelligence Authorization Act for fiscal year **[**2016**]** *2017*.

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 **[**Independent**]** 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) None of the funds made available in this or any prior Act under the heading "Defense Nuclear Nonproliferation" may be made available to enter into new contracts with, or new agreements for Federal assistance to, the Russian Federation.

(b) The Secretary of Energy may waive the prohibition in subsection (a) if the Secretary determines that such activity is in the national security interests of the United States. This waiver authority may not be delegated.

(c) A waiver under subsection (b) shall not be effective until 15 days after the date on which the Secretary submits to the Committees on Appropriations of both Houses of Congress, in classified form if necessary, a report on the justification for the waiver.**]**

SEC. **[**308**]** *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. 309. Of the amounts made available by this Act for "National Nuclear Security Administration—Weapons Activities", up to $50,000,000 may be reprogrammed within such account for Domestic Uranium Enrichment, subject to the notice requirement in section 301(e).**]**

[SEC. 310. (a) Unobligated balances available from appropriations are hereby rescinded from the following accounts of the Department of Energy in the specified amounts:

(1) "Energy Programs—Energy Efficiency and Renewable Energy", $1,355,149.00 from Public Law 110–161; $627,299.24 from Public Law 111–8; and $1,824,051.94 from Public Law 111–85.

(2) "Energy Programs—Science", $3,200,000.00.

(b) No amounts may be rescinded by this section from amounts that were 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.**]**

[SEC. 311. Notwithstanding any other provision of law, the provisions of 40 U.S.C. 11319 shall not apply to funds appropriated in this title to Federally Funded Research and Development Centers sponsored by the Department of Energy.**]**

[SEC. 312. None of the funds made available in this Act may be used—

(1) to implement or enforce section 430.32(x) of title 10, Code of Federal Regulations; or

(2) to implement or enforce the standards established by the tables contained in section 325(i)(1)(B) of the Energy Policy and Conservation Act (42 U.S.C. 6295(i)(1)(B)) with respect to BPAR incandescent reflector lamps, BR incandescent reflector lamps, and ER incandescent reflector lamps.**]**

[SEC. 313. (a) Of the funds appropriated in prior Acts under the headings "Fossil Energy Research and Development" and "Clean Coal Technology" for prior solicitations under the Clean Coal Power Initiative and FutureGen, not less than $160,000,000 from projects selected under such solicitations that have not reached financial close and have not secured funding sufficient to construct the project prior to 30 days after the date of enactment of this Act shall be deobligated, if necessary, shall be utilized for previously selected demonstration projects under such solicitations that have reached financial close or have otherwise secured funding sufficient to construct the project prior to 30 days after the date of enactment of this Act, and shall be allocated among such projects in proportion to the total financial contribution by the recipients to those projects stipulated in their respective cooperative agreements.

(b) Funds utilized pursuant to subsection (a) shall be administered in accordance with the provisions in the Act in which the funds for those demonstration projects were originally appropriated, except that financial assistance for costs in excess of those estimated as of the date of award of the original financial assistance may be provided in excess of the proportion of costs borne by the Government in the original agreement and shall not be limited to 25 percent of the original financial assistance.

(c) No amounts may be repurposed pursuant to this section from amounts that were 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.

(d) This section shall be fully implemented not later than 60 days after the date of enactment of this Act.**]**

SEC. 308. Amounts made available by this title may be transferred to the Technology Commercialization Fund in amounts not to exceed 0.9% of the amounts appropriated for applied energy research and development. Amounts so transferred shall be available for a broad spectrum of energy technology or combination of technologies, consistent with section 1001 of the Energy Policy Act of 2005 (42 U.S. Code paragraph 16391(e)), and shall remain available until expended.

SEC. 309. Not to exceed 5 percent of any appropriation made available for Department of Energy activities funded in this Act or subsequent Energy and Water Development and Related Agencies Appropriations Acts 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. 310. Consolidated Emergency Operations Center. Amounts available for the Department of Energy under this title in this and prior appropriations Acts shall be available for the design of a consolidated Emergency Operations Center: Provided, That no amounts may be repurposed from amounts that were designated by the Congress as an emergency requirement pursuant to the Concurrent Resolution on the Budget or the Balanced Budget and Emergency Deficit Control Act of 1985, as amended.

SEC. 311. 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.

(Energy and Water Development and Related Agencies Appropriations Act, 2016.)

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. (a) None of the funds made available in title III of this Act may be transferred to any department, agency, or instrumentality of the United States Government, except pursuant to a transfer made by or transfer authority provided in this Act or any other appropriations Act for any fiscal year, transfer authority referenced in the explanatory statement described in section 4 (in the matter preceding division A of this consolidated Act), or any authority whereby a department, agency, or instrumentality of the United States Government may provide goods or services to another department, agency, or instrumentality.

(b) None of the funds made available for any department, agency, or instrumentality of the United States Government may be transferred to accounts funded in title III of this Act, except pursuant to a transfer made by or transfer authority provided in this Act or any other appropriations Act for any fiscal year, transfer authority referenced in the explanatory statement described in section 4 (in the matter preceding division A of this consolidated Act), or any authority whereby a department, agency, or instrumentality of the United States Government may provide goods or services to another department, agency, or instrumentality.

(c) The head of any relevant department or agency funded in this Act utilizing any transfer authority shall submit to the Committees on Appropriations of both Houses of Congress a semiannual report detailing the transfer authorities, except for any authority whereby a department, agency, or instrumentality of the United States Government may provide goods or services to another department, agency, or instrumentality, used in the previous 6 months and in the year-to-date. This report shall include the amounts transferred and the purposes for which they were transferred, and shall not replace or modify existing notification requirements for each authority.**]**

SEC. **[**503**]** *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 Action to Address Environmental Justice in Minority Populations and Low-Income Populations). *(Energy and Water Development and Related Agencies Appropriations Act, 2016.)*