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, [$1,684,000,000] $2,081,445,000 to remain available until expended[, of which, $91,000,000 shall be transferred to "Department of Energy—Energy Programs—Nuclear Energy", for the Advanced Test Reactor (ATR)]: *Provided*, that [$51,700,000] $58,525,000 shall be available until September 30, [2023] 2024 for program direction.

Explanation of Changes

Changes from the FY 2021 Enacted language consist of changes to the requested funding amount and the period of availability of program direction funding. The FY 2023 Budget Request reflects a 23.6% increase from FY 2021 Enacted levels (not including the ATR transfer). Increased funding in FY 2023 relative to FY 2021 maintains support for the current fleet, continues advanced technology development investment in support of today's fleet and future capabilities, and supports infrastructure modernization and reduction of legacy environmental liabilities. Additionally, the Spent Fuel Handling Recapitalization Project (SFHP) funding profile is updated to reflect the remaining resources required to fund the updated Total Project Cost.

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. 117-81, National Defense Authorization Act for Fiscal Year 2022
- P.L. 117-103, Consolidated Appropriations Act, 2022

Naval Reactors[a]

	FY 2021 Enacted	FY 2022 Annualized CR	FY 2023 Request	FY 2023 Request vs FY 2021 Enacted ($)	FY 2023 Request vs FY 2021 Enacted (%)
Naval Reactors	1,684,000	1,684,000	2,081,445	397,445	**23.6%**
Total Naval Reactors	**1,684,000**	**1,684,000**	**2,081,445**	**397,445**	**23.6%**

Overview

The Naval Reactors (NR) appropriation 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 40% of the Navy's major combatants)[b] 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 2023 Budget Request

Naval Reactors request of $2,081,445,000 in FY 2023 is for continued achievement of its core objective of ensuring the safe and reliable operation of the Nation's nuclear fleet.

Naval Reactors request supports continued reinvestment in advanced technology development, modernization of infrastructure, and remediation of environmental liabilities.

Naval Reactors request includes additional funding for the Spent Fuel Handling Recapitalization Project (SFHP) and to support Navy timelines for future attack submarine development.

Major Outyear Priorities and Assumptions

The outyear funding (FY 2024 through FY 2027) for Naval Reactors is $7,582,476,000. 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 67 submarines, 11 aircraft carriers, and five 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 2023 is $2,563,000. This funding covers certain shared enterprise activities including managing enterprise-wide systems and data, telecommunications, and supporting the integrated acquisition environment.

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[a] Throughout this document, funding does not reflect the mandated transfer of $91 million in FY 2021 and FY 2022 to the Office of Nuclear Energy for operation of the Advanced Test Reactor.

[b] Major combatants, in this instance, include aircraft carriers, submarines, and surface combatants based on the "Active in Commission" column from the Naval Vessel Register.

Rickover Fellowship Program
Naval Reactors 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 $1,387,632 in FY 2023 to support this program.

Naval Reactors Funding

(Dollars in Thousands)

	FY 2021 Enacted	FY 2022 Annualized CR	FY 2023 Request	FY 2023 Request vs FY 2021 Enacted ($)	FY 2023 Request vs FY 2021 Enacted (%)
Naval Reactors					
Naval Reactors Operations and Infrastructure	530,600	530,600	695,165	+164,565	31.0%
Naval Reactors Development	568,000	568,000	798,590	+230,590	40.6%
S8G Prototype Refueling	135,000	135,000	20,000	-115,000	-85.2%
Columbia-Class Reactor Systems Development	64,700	64,700	53,900	-10,800	-16.7%
Program Direction	51,700	51,700	58,525	+6,825	13.2%
Construction	334,000	334,000	455,265	+121,265	36.3%
Total, Naval Reactors	**1,684,000**	**1,684,000**	**2,081,445**	**+397,445**	**23.6%**

Outyears for Naval Reactors Funding

(Dollars in Thousands)

	FY 2024 Request	FY 2025 Request	FY 2026 Request	FY 2027 Request
Naval Reactors				
Naval Reactors Operations and Infrastructure	720,543	801,430	802,473	775,484
Naval Reactors Development	835,319	840,340	864,138	813,090
S8G Prototype Refueling	0	0	0	0
Columbia-Class Reactor Systems Development	52,900	45,608	35,300	29,700
Program Direction	59,538	61,622	63,779	67,811
Construction	234,750	118,600	147,851	212,200
Total, Naval Reactors	**1,903,050**	**1,867,600**	**1,913,541**	**1,898,285**

Naval Reactors
Funding by Program

(Dollars in Thousands)

	FY 2021 Enacted	FY 2022 Annualized CR	FY 2023 Request	FY 2023 Request vs FY 2021 Enacted ($)	FY 2023 Request vs FY 2021 Enacted (%)
Naval Reactors					
Naval Reactors Operations and Infrastructure					
Research Reactor Facility Operations & Maintenance	142,900	142,900	116,800	-26,100	-18.3%
MARF Defueling and Layup	7,098	7,098	57,100	+50,002	704.5%
Laboratory Facility Regulation, Compliance, & Protection	138,859	138,859	158,415	+19,556	14.1%
Nuclear Spent Fuel Management	124,013	124,013	147,180	+23,167	18.7%
Radiological/Environmental Remediation & Demolition	76,325	76,325	131,400	+55,075	72.2%
Technical Infrastructure Operations Support	0	0	18,250	+18,250	100.0%
Capital Equipment	0	0	16,500	+16,500	100.0%
Minor Construction	41,405	41,405	49,520	+8,115	19.6%
Total, Naval Reactors Operations and Infrastructure	**530,600**	**530,600**	**695,165**	**+164,565**	**31.0%**
Naval Reactors Development					
Ship Construction & Maintenance Support	34,800	34,800	39,000	+4,200	12.1%
Nuclear Reactor Technology	182,600	182,600	282,150	+99,550	54.5%
Reactor Systems & Component Technology	258,600	258,600	361,450	+102,850	39.8%
Advanced Test Reactor Operations	91,000	91,000	90,890	-110	-0.1%
Capital Equipment	1,000	1,000	25,100	+24,100	2410.0%
Total, Naval Reactors Development	**568,000**	**568,000**	**798,590**	**+230,590**	**40.6%**
S8G Prototype Refueling	**135,000**	**135,000**	**20,000**	**-115,000**	**-85.2%**
Columbia-Class Reactor Systems Development	**64,700**	**64,700**	**53,900**	**-10,800**	**-16.7%**
Program Direction	**51,700**	**51,700**	**58,525**	**+6,825**	**13.2%**
Construction	**334,000**	**334,000**	**455,265**	**+121,265**	**36.3%**
Total, Naval Reactors	**1,684,000**	**1,684,000**	**2,081,445**	**+397,445**	**23.6%**

Outyears for Naval Reactors Funding

(Dollars in Thousands)

	FY 2024 Request	FY 2025 Request	FY 2026 Request	FY 2027 Request
Naval Reactors				
Naval Reactors Operations and Infrastructure				
Research Reactor Facility Operations & Maintenance	104,600	100,000	113,500	149,700
MARF Defueling and Layup	84,100	85,900	48,000	600
Laboratory Facility Regulation, Compliance, & Protection	168,050	168,304	176,325	178,407
Nuclear Spent Fuel Management	158,250	188,700	210,000	215,800
Radiological/Environmental Remediation & Demolition	132,400	151,400	169,704	140,907
Technical Infrastructure Operations Support	19,700	21,200	21,900	21,900
Capital Equipment	3,600	14,100	0	0
Minor Construction	49,843	71,826	63,044	68,170
Total, Naval Reactors Operations and Infrastructure	**720,543**	**801,430**	**802,473**	**775,484**
Naval Reactors Development				
Ship Construction & Maintenance Support	39,000	39,200	39,300	39,900
Nuclear Reactor Technology	282,502	284,892	299,450	272,520
Reactor Systems & Component Technology	406,018	405,800	414,650	389,300
Advanced Test Reactor Operations	92,799	94,748	96,738	98,770
Capital Equipment	15,000	15,700	14,000	12,600
Total, Naval Reactors Development	**835,319**	**840,340**	**864,138**	**813,090**
S8G Prototype Refueling	**0**	**0**	**0**	**0**
Columbia-Class Reactor Systems Development	**52,900**	**45,608**	**35,300**	**29,700**
Program Direction	**59,538**	**61,622**	**63,779**	**67,811**
Construction	**234,750**	**118,600**	**147,851**	**212,200**
Total, Naval Reactors	**1,903,050**	**1,867,600**	**1,913,541**	**1,898,285**

Naval Reactors
Explanation of Major Changes
(Dollars in Thousands)

	FY 2023 Request vs FY 2021 Enacted ($)
Naval Reactors	
Naval Reactors Operations and Infrastructure: This increase (+31%) supports progression toward achieving remediation goals in decontamination and decommissioning efforts, continued recapitalization of infrastructure, and increasing efforts to prepare for delivery of the Naval Spent Fuel Handling Facility.	+164,565
Naval Reactors Development: This increase (+41%) supports development of the methods, models, materials, components, and systems required for future platforms to achieve enhanced capability, improved affordability, and sustained reliability and provide continuous support to U.S. Navy fleet operations.	+230,590
S8G Prototype Refueling: This decrease (-85%) is consistent with the project's revised funding profile and supports project completion in FY 2023.	-115,000
***Columbia*-class Reactor Systems Development:** This decrease (-17%) is consistent with the project's planned funding profile and supports FY 2023 production, analysis, and testing execution.	-10,800
Program Direction: This funding increase (+13%) includes funding for personnel and pay related costs, travel requirements, and IT hardware and maintenance operations.	+6,825
Construction: This increase (+36%) supports cost increases for the Spent Fuel Handling Project, in addition to funding a new start construction project at the Bettis site.	+121,265
Total, Naval Reactors	**+397,445**

Naval Reactors
Naval Reactors Operations and Infrastructure

Description
The Naval Reactors Operations and Infrastructure resources ensure Naval Reactors maintains an integrated and effective enterprise across program sites located in Pennsylvania, New York, and Idaho, to provide safe and environmentally conscious operation of the nuclear fleet. The Naval Reactors Operations and Infrastructure program resources provide funding for work associated with the operation of one land-based nuclear prototype and lay-up of one land-based prototype at the Kesselring Site located in West Milton, NY; two dedicated, government-owned, contractor-operated laboratory facilities, Knolls and Bettis located in Niskayuna, NY and West Mifflin, PA, respectively; and naval spent nuclear fuel handling facilities and operations at the Naval Reactors Facility at the Idaho National Laboratory in Idaho. These resources fund work that ensures unique Naval Reactors' infrastructure and advanced naval nuclear capabilities are maintained well into the future. These efforts include:

- Operation, maintenance, and lay-up of the DOE land-based prototypes supporting technology development and nuclear operator training.
- Planning and preparations to defuel the Modifications and Additions to Reactor Facilities (MARF) prototype and perform the necessary work to leave the plant in a benign condition for eventual disassembly.
- Activities to ensure Naval Reactors program operations meet or exceed applicable federal, state, and local standards and requirements.
- Disposition of naval spent nuclear fuel from the inactivation and refueling of ships.
- Remediation, dismantlement, and disposal of inactive Naval Reactors program systems, facilities, and areas.
- Providing technical infrastructure support at laboratory facilities enabling technical work supporting the operations of the fleet as well as design and development efforts.
- Design and procurement of capital equipment.
- Design and construction of facilities and infrastructure to provide for capacity, security, safety, environmental, and obsolescence needs.

Research Reactor Facility Operations & Maintenance
The mission of this subprogram is to support one land-based prototype located at the Kesselring Site in New York through the following work efforts:

- Test and examine reactor materials, components, systems, and new design applications under actual operating conditions.
- Provide a ship-like operating platform to train nuclear operators.
- Support improved design activities for the operating prototypes and perform systematic preventive maintenance, corrective maintenance, upgrades, and modifications on the prototypes and their support equipment.
- Evaluate problems using engineering tests and other troubleshooting techniques.
- Procure and maintain adequate spare parts, material, specialized tools and instrumentation for troubleshooting and prototype testing.

MARF Defueling and Layup
The mission of this subprogram is to defuel and layup the MARF prototype in order to place the plant in a safe and benign condition for eventual dismantlement and off-site disposal. The requested funds permit the design and construction of defueling facilities, the preparation and staging of required equipment for defueling, and the training and proper execution of defueling activities.

Laboratory Facility Regulation, Compliance & Protection
The mission of this subprogram is to ensure that Naval Reactors operations and design activities meet or exceed applicable federal, state, and local standards and requirements, such as Radiological Controls, Environmental, Safety and Health, Quality Assurance, and Nuclear Materials Management. This compliance is accomplished by:

- Personnel training, instruction, supervision, independent oversight, and formal auditing.
- Extensive personnel and environmental sampling and monitoring programs to ensure operations have no discernible impact on human health or the environment.

- Preparing and issuing numerous reports required by federal, state, and local regulations and requirements.
- Reviewing of new and existing nuclear plant design and the related procurement of nuclear fuel and new project equipment.

Naval Reactors' radiological workforce is a highly trained group, capable of responding in the event of a radiological accident, as well as supporting routine radiological operations.

Nuclear Spent Fuel Management

The mission of this subprogram is to fulfill Naval Reactors' cradle-to-grave responsibility for aspects of naval nuclear propulsion by properly managing naval spent nuclear fuel (NSNF). Specifically, resources in this subprogram support the safe reception, handling, preparation, packaging, and temporary storage of NSNF coming from the nuclear-powered fleet and prototypes. This includes fuel handling operations at Department of Energy facilities, mechanically processing NSNF at the Naval Reactors Facility (NRF) in the State of Idaho, packaging the NSNF for dry storage in a geologic repository or interim storage facility, and disposing of the radiological waste by-products produced by these processes. The subprogram also supports nuclear-powered warship deployments by managing Naval Reactors NSNF shipping container capacity for aircraft carrier and submarine refueling overhauls and defueling inactivation operations; conducts destructive and non-destructive examinations of expended naval cores and irradiated test specimens from the Advanced Test Reactor located at the Idaho National Laboratory; and manages the construction of projects that directly support improvements to the NSNF receiving, processing, packaging, and disposal efforts, reducing radiological risks at the NRF.

Radiological/Environmental Remediation & Demolition

The mission of this subprogram is to remediate, dismantle, and dispose of inactive Naval Reactors systems, facilities, and areas that once supported research and development, design, testing, training, and prototype operations. Requirements are prioritized based on a criteria model that ensures currently available funding is provided to projects most critical to Naval Reactors with emphasis on balancing factors such as risk reduction and inactive facility lifecycle costs.

Technical Infrastructure and Operations Support

The mission of this subprogram is to support laboratory and testing facilities at Naval Nuclear Laboratory (NNL) to enable the technical work supporting the operations of the naval nuclear fleet, as well as engineering and development efforts required to ensure continued performance, safety and reliability, and resolution of emergent fleet problems. This includes the preparation and maintenance of infrastructure at program laboratory sites (e.g., laboratory space/building, test loops, hot cells) to support Program technical work (e.g., testing, engineering and analysis, design, and examinations). The upfront work needed to prepare laboratory facilities is distinct from operating the systems or test programs within such facilities (e.g., actual execution/performance of the test once a test loop has been prepared). Technical infrastructure such as test loops are large in size and require significant infrastructure (e.g., building dimensions, utilities, ASME Boiler and Pressure Vessel Code calculations support in order to prepare the tests for safe operations. The skills required to engineer and maintain technical infrastructure are similar to the skills used to support general facility infrastructure (e.g., general office buildings), and test engineers work collaboratively with site facilities engineers to maintain safe and reliable test operation.

Capital Equipment

The mission of this subprogram is to provide the critical technical tools and equipment to ensure that Naval Reactors can achieve its mission. This subprogram includes Major Items of Equipment (MIE) and non-MIE. Capital equipment is defined as non-construction related equipment, computer systems, tooling, and furniture or fixtures having useful life of two or more years and costing greater than $500,000. The tools and equipment are required to support the other work efforts within the sub-categories of Naval Reactors Operations and Infrastructure (e.g. operator training and facilities maintenance).

Minor Construction Projects

The mission of this subprogram is to execute minor construction projects of a general nature, the Total Estimated Cost of which may not exceed the established minor construction threshold. Minor construction projects are necessary to adapt facilities to new or improved production techniques, to effect economies of operations, and to reduce or eliminate health, fire, and security vulnerabilities. These projects provide for design and construction, additions, and improvements to land, buildings, and utility systems, and they may include construction of small new buildings, additions to roads, and general

area improvements. Funding is derived from established site construction plans and may be used for emergent and unforeseen infrastructure needs.

Highlights and Major Changes in the FY 2023 Budget Request
The increase of $164,565,000 supports progression toward achieving remediation goals in decontamination and decommissioning efforts, continued recapitalization of infrastructure, and increasing efforts to prepare for delivery of the Naval Spent Fuel Handling Facility.

FY 2024-FY 2027 Key Milestones
Research Reactor Facility Operations and Maintenance

- Obtain core depletion data from the land-based prototype to validate designs and methods of current operating fleet cores.
- Perform maintenance on the land-based prototype, including replacement of major reactor plant, steam plant, and safety system components.
- Conduct core test programs and evaluations on the land-based prototype to validate current and future fleet core designs/methods as well as prototype reactor core performance.
- Conduct testing of electronic power generation and conversion units deployed in the fleet and provide test bed for software and hardware upgrades prior to fleet deployment to ensure that problems with new technologies and designs are resolved before broader application and do not affect the deployed nuclear fleet.
- Develop technology for future fleet deployment with the use of chemistry automation testing that provides improved data and reduced time and exposure requirements for future fleet application.
- Operate and maintain Engineered Safety Features System.

MARF Defueling and Layup

- Complete detailed facility designs.
- Initiate material ordering and facilities preparation.
- Construct and outfit defueling facility.
- System preparation and plant disassembly.
- Execute fuel removal, shipment to NRF and plant layup.

Laboratory Facility Regulation, Compliance & Protection

- Administer radiological controls, including radiological monitoring, radiological engineering, radiation health, radiological controls training, and auditing.
- Provide regulatory compliance oversight and auditing in environmental programs, environmental monitoring, safety, and industrial hygiene.
- Operate mixed, hazardous, and radiological waste storage and processing facilities.
- Prepare waste shipment for treatment or disposal.
- Develop tools and training for organizations to apply Program quality of work principles, quality system requirements, and NR program standards to Naval Nuclear Laboratory (NNL) work.
- Perform internal audits and inspections of NNL work.
- Provide oversight of suppliers for NNL procurements.
- Establish and maintain policies and procedures for nuclear material control and accountability and nuclear criticality safety.

Nuclear Spent Fuel Management

- Package spent fuel canisters of NSNF into dry storage to support an agreement with the State of Idaho for NSNF located in water pool storage for a period less than six years.
- Mechanically process NSNF modules for placement into dry storage to support legal requirements in the agreement with the State of Idaho.
- Load sleeves of NSNF for packaging method B disposal to support legal requirements in the agreement with the State of Idaho.

- Receive, unload, and return for next use or ultimate disposal, shipping containers of NSNF to support aircraft carrier and submarine refuelings/defuelings and inactivation operations.
- Deliver processing and packaging hardware, fuel handling equipment, and fuel handling procedures in support of NSNF, and Packaging Method B dry storage campaigns.
- Train personnel and checkout equipment/procedures for commencement of operations in the Naval Spent Fuel Handling Facility (NSFHF).

Radiological/Environmental Remediation & Demolition

All sites:

- Conduct remediation of inactive NR Program contaminated systems, facilities, and areas to reduce potential environmental liabilities.
- Continue execution of NNL, NR, and Department of Energy-Environmental Management (DOE-EM) collaborative tasks that support facility turnover to DOE-EM, including but not limited to site walkdowns, project scoping, project schedules, establishment of supporting infrastructure, utility re-routes, historical preservation, and environmental evaluations.

Bettis Laboratory (BL):

- Complete multiple waste load-out campaigns in the Materials Evaluation Laboratory

Naval Reactors Facility (NRF):

- Complete dismantlement of the S1W Prototype Complex.
- Commence dismantlement of A1W Prototype support facilities.

Knolls Laboratory (KL):

- Continue environmental remediation to support United States EPA and New York State Department of Environmental Conservation (NYSDEC) initiatives for Solid Waste Management Units (SWMUs) and Area of Concerns (AOCs) identified. Environmental remediation projects are in accordance with NYSDEC approved Corrective Action work schedules.
- Execute abatement of asbestos in numerous radiologically controlled spaces throughout the site.
- Complete capping of the Knolls Laboratory Land Disposal Area and prepare required regulatory reports.
- Commence F Complex demolition.
- Complete demolition of Q-Complex, including subsequent soil remediation and underground pier removal.
- Complete removing support systems from the former laboratory critical facilities (Flexible Plastic Reactor (FPR), the Pressurized Test Reactor (PTR), the Full Core Physics Experiment (FCPE) and the Thermal Test Reactor (TTR)).

Kesselring Site (KS):

- Complete D&D of multiple legacy industrial facilities in the southeast quadrant of the site.
- Commence D&D of Hortonsphere complex.

Technical Infrastructure and Operations Support

- Consolidate laboratory manpower efforts while transitioning operations in an effort to complete Knolls, Bettis corrosion testing consolidation by FY31, which will add efficiencies while retracting future costs for the program.

Capital Equipment

- Laboratory Network Upgrades; replaces network infrastructure which provides basic connectivity for every IT system used in the NR Program. Nearly every enterprise application, database, file repository, website, etc. is connected through this network infrastructure.

Minor Construction Projects

- BL AMTL Upgrade EMTF Infrastructure
- BL Simulation Development Laboratory (SDL) and Bettis Reactor Engineering School (BRES)
- KL Data Center Power and Capacity Upgrades
- KL 002 Outfall

- KS Storm Water Upgrades
- KS CAS Relocation
- KS Radio Upgrade
- NRF Expended Core Facility (ECF) Electric Heat Conversion

FY 2021 Accomplishments

- Issued plan for MARF servicing facility modifications to support defueling and commence the detailed facility designs.
- Prepared detailed plans for starting operations in the new Spent Fuel Handling Recapitalization Project facility.
- Packaged 6 spent fuel canisters into dry storage to support meeting time requirements in an agreement with the State of Idaho for NSNF located in water pool storage.
- Mechanically processed 86 NSNF modules for placement into dry storage to support legal requirements in the agreement with the State of Idaho.
- Loaded 15 sleeves of NSNF for packaging method B disposal to support legal requirements in the agreement with the State of Idaho.
- Received, unloaded, and returned for next use or ultimate disposal 8 shipping containers of NSNF to support aircraft carrier and submarine refuelings/defuelings and inactivation operations.
- Completed removal of the D1G Prototype Primary Shield Tank.
- Completed multiple waste load-out campaigns in the Materials Evaluation Laboratory at Bettis.

Naval Reactors
Naval Reactors Development

Description
The Naval Reactors Development (NRD) resources fund work that ensures the current and future fleet is the most advanced, well-maintained, and capable nuclear fleet in the world. This funding supports unique technologies used in naval reactors that are crucial to delivering superior navy fleet operations and dominance in the maritime domain to counter the increasing threats from our adversaries. These efforts include:

- Supporting naval operations and strategic mission needs by providing technical support to the fleet and ensuring safe reactor operations through engineering solutions to emergent reactor plant issues, enabling equipment replacement and maintenance, and tracking reactor performance over time.
- Developing and enhancing the fundamental methods, modeling, and materials used in reactor cores and plants, which reduce lifecycle costs and improves performance.
- Designing and maintaining the major reactor plant components and plant systems required for technologically superior naval nuclear propulsion.
- Providing funding for the operation of the Advanced Test Reactor (ATR) to DOE Office of Nuclear Energy and performing irradiation testing for ongoing evaluation of new material applications and core designs.
- Designing and procuring capital equipment in support of the work above.

Ship Construction & Maintenance Support
The mission of this subcategory is to directly support both the operation and new construction of the nuclear-powered fleet. Operating reactors require continuous mechanical, thermal, hydraulic, materials, and chemistry analyses to fully evaluate the impact of existing design features, core materials, and system modifications on reactor performance and to ensure safe operation throughout the life of the core. While overall fleet support efforts are funded across all Naval Reactors Development subprograms (excluding the Advanced Test Reactor), SCMS supports direct efforts. This includes analyses to extend the reactor operational life of a ship, reactor servicing technical support, new instrumentation and control system qualification prior to ship installation, emergent problem resolution arising during propulsion plant component manufacturing, installation, testing or operation, and continued technical validation of a ship's reactor performance and safety basis through operational life of the ship. Also, maintenance of the reactor plants involves designing equipment and systems to safely handle new fuel and highly radioactive spent fuel including safely maintaining plant components, and resolving emergent obsolescence issues. These efforts are closely associated with the more comprehensive technology efforts that underpin NR's fleet support efforts in Nuclear Reactor Technology (NRT) and Reactor Systems & Component Technology (RSCT).

Nuclear Reactor Technology
The mission of this subcategory is to develop and deploy core material systems that improve nuclear safety, stealth capability, tactical ability, and reactor plant capability and performance; and to support the qualification of the manufacture of those systems at the naval nuclear core vendor. The materials testing executed using NRT resources forms the basis for naval nuclear reactor operational capability, which has enabled over 65 years of safe nuclear reactor operations while increasing reactor plant performance and reducing platform lifecycle cost. This research and development capability informs new design decisions and enables timely response to issues encountered in the operating fleet. Advanced fuel and poison development efforts, including specimen manufacture, irradiation testing, and post irradiation examination, are executed using resources from this subcategory. Lastly, this subcategory supports the examination of expended fuel modules and irradiated core components at the Expended Core Facility located at the Naval Reactors Facility, which is part of the Idaho National Laboratory. This examination capability provides real performance data on hardware to ultimately understand both long-term material behavior and design impacts.

Reactor Systems & Component Technology
The mission of this subcategory is to provide Naval Reactors with the technology for major reactor plant components (e.g., steam generators, reactor coolant pumps, valves) as well as plant systems (e.g., instrumentation and control). This subcategory provides the support and expertise necessary to ensure the satisfactory operation of reactor plant components in the naval nuclear fleet and prototypes, to design and implement *Virginia*-class and *Ford*-class reactor plant components,

and to develop higher power density, faster to build, and more affordable components for technology insertion applications in existing ship classes. The major objectives of instrumentation and control component and system development are to deliver the next generation of instrumentation, control, and electrical equipment for naval nuclear propulsion applications to improve ship mission capabilities, reactor safety, and widen the advanced technology gap over our adversaries. This subcategory also enables the Program's advanced technology incubator effort to accelerate the pace of R&D that holds promise for step-change advancements and asymmetrical warfighting advantages for naval nuclear propulsion.

Advanced Test Reactor Operations

The mission of this subcategory is to provide a prototypical thermal irradiation environment to support core design, manufacturing development, fleet support, and analytical model development for reactor materials and nuclear fuels. The ATR is a test reactor facility owned by the DOE Office of Nuclear Energy and operated by its contractor. Naval Reactors has sole use of five of nine ATR test loops. This subprogram provides the majority of the ATR's base operations funding.

Capital Equipment

The mission of this subcategory is to provide the critical technical tools and equipment to ensure that Naval Reactors can achieve its mission. This subprogram includes both MIE (major items of equipment) and non-MIE. Capital equipment is defined as non-construction related equipment, computer systems, tooling, and furniture or fixtures having a useful life of two or more years and costing greater than $500,000. The tools and equipment are required to support other work efforts within the subcategories of Naval Reactors Development (e.g., designing and testing of reactor plant systems, developing new technologies).

Highlights and Major Changes in the FY 2023 Budget Request

The increase of $230,590,000 supports development of the methods, models, materials, components, and systems required for future platforms to achieve enhanced capability, improved affordability, and sustained reliability and provides continuous support to U.S. Navy fleet operations. Recent increases in this area of NR's budget come at a pivotal time for the NR Program, in which over the last decade, the need for generational investment in infrastructure, which is not yet complete, required a reduction in mid- to long- term technology development efforts. During this time, historic technology development efforts were leveraged to support *Columbia*-class design and existing nuclear-powered submarines and aircraft carriers in the fleet. In order to account for deferred technology R&D to support infrastructure investments, Naval Reactors must identify and develop cutting-edge technologies to aggressively improve propulsion plant capability and dramatically reduce design, acquisition, and lifecycle cost and timespans. This investment in R&D is a critical step in maintaining the Navy's dominance in the maritime domain.

FY 2024-FY 2027 Key Milestones

Ship Construction & Maintenance Support

- Validate reactor performance and safety basis through operational life of *Los Angeles*-class, *Ohio*-class, *Virginia*-class, *Seawolf*-class, *Nimitz*-class, and *Ford*-class ships.
- Perform thermal and mechanical analyses to extend the reactor and propulsion plant operational life of the submarine fleet and carrier fleet, ensuring the overall number of nuclear ships continues to meet strategic requirements. This includes service life extension work for *Los Angeles*-class, *Ohio*-class, and *Nimitz*-class.
- Perform integrated reactor plant analysis and instrumentation and control system qualification prior to ship installation to ensure safe and reliable operation.
- Support resolution of fabrication or shipyard issues for reactor equipment in production.
- Support emergent obsolescence management issues of technology and equipment pertaining to construction and maintenance support.

Nuclear Reactor Technology

- Support manufacture of the first *Columbia*-class reactor core and continued manufacture of *Virginia*-class and *Ford*-class reactor cores.
- Deliver Electro-Discharge Machining (EDM) equipment as a modern replacement for Expended Core Facility underwater milling equipment for fuel separation. EDM will provide more inherent safety features and more efficient, automated processing capability.

- Complete design and delivery of lower-end reactor module inspection equipment needed for examination of modern core hardware and execute this first-of-a-kind inspection on the Advanced Fleet Reactor core.
- Perform core examinations on structural and fuel materials of a land-based prototype core informing operating Fleet performance and new design decisions.
- Operate, upgrade, and maintain material testing and examination capabilities. These capabilities enable maintaining reactor plant safety for new materials and manufacturing deviations, and allows for minimum impact to ship's operating availability.
- Execute vendor manufacturing development necessary to scale-up improvements in fuel and core manufacturing to increase yields, increase efficiency, and reduce cost. This requires transfers and implementation of laboratory-designed specialized equipment at production facilities.
- Complete core physics exams in operating ships to confirm reactor operating lifetime performance.
- Complete conceptual design for long-term continuity of expended core testing and examination capabilities. Examination of naval spent cores is critical to validating the safe operation of cores in the fleet, resolving technical issues, refining analytical models, and establishing spent fuel shipping requirements.

Reactor Systems & Component Technology

- Develop predictive methodologies and data analytics for evaluation of in-service components in order to reduce lifecycle costs (e.g., reduce total planned nuclear maintenance workload of the fleet by 30%), optimally schedule repairs and thereby increase operational availability.
- Develop and implement advanced instrumentation & control systems exploiting passive cooling, enhanced cyber-security features, and increased computational capability for fleet applications to increase performance and reduce acquisition and lifecycle costs.
- Research, develop, and test new sensor technologies for integration into existing and future propulsion plants in order to better enable predictive maintenance, and improve accuracy and plant responsiveness, increased sensor density (e.g., more sensing elements per instrument), thereby reducing required number of sensors while enhancing operator-assisted control systems and operational reliability.
- Develop and integrate technologies (e.g., advanced power conversion equipment) to improve shipboard power density and efficiency, enabling more capable and compact systems (e.g., reducing electrical component cabinet volume by up to 50%), and thereby reducing weight and hull size impacts.
- Develop and qualify advanced manufacturing capabilities, such as powder metallurgy hot isostatic pressing (PM-HIP) and additive manufacturing (AM), for near-term operating platform insertions. These manufacturing technologies enable performance-enhancing designs with unique or complex geometries while reducing cost and production timespan and improving resilience of the industrial base.
- Design, build, test, and qualify improved heat exchangers for reactor plant application, with the goal of increasing power density to enhance capability, lower cost, and reduce ship weight and hull size impacts.
- Establish external technology incubation sources to identify relevant emergent technologies (e.g., artificial intelligence, advanced robotics, energy storage) that potentially provide a step-change in naval nuclear plant competitive advantage.
- Develop, improve, and employ reactor design, analysis, and simulation software tools for new plants to improve capability while reducing cost and development time.
- Develop radiation shield methods and perform analyses for reactor plants, and radioactive material handling equipment and facilities; and, verify their effectiveness through shield surveys.
- Provide structural analyses and assessments for new designs and existing fleet to ensure propulsion continuity and safe operation under battle shock and ship maneuvering transients.
- Perform testing and analysis of noise sources in components and develop tests to improve propulsion plant acoustics and submarine stealth.
- Continue to monitor and redesign components and integrated systems as necessary to remove future emergent obsolescence issues.

Advanced Test Reactor Operations

- Perform operations, maintenance, and engineering support work necessary to operate the ATR for a target of 210 days per year (three 60-day irradiation test cycles and up to two transient tests). These test cycles are necessary to obtain

data to define performance limits of fuel fabricated from existing fuel manufacturing technologies and support continued safe reactor operations.
- Safely handle, ship, and receive 14 irradiation test trains per year from the Naval Reactors Facility where irradiations test specimens are assembled and examined. This work is necessary as part of preparing new Navy test specimens for the ATR and inspecting and characterizing specimens that have been irradiated.
- Procure nuclear fuel and spare parts to support ATR operations.
- Refurbish the components and infrastructure to bring a currently unusable ATR test loop back into service. This refurbishment will enable subsequent refurbishment of other operating test loop equipment and infrastructure to greatly improve ATR reliability. The funding for the first refurbishment is categorized under Nuclear Reactor Technology.

Capital Equipment
- Procure High Performance Computing equipment to enable design and analysis workload to be completed at a much lower cost than physical tests.
- Replace Radiological Materials Laboratory (RML) High Radiation scanning electron microscope (SEM) to safely analyze radioactive materials used to evaluate fracture surfaces, determine chemical constituents, and provide detailed metallographic images on expended core hardware and irradiation test specimens.
- Recapitalize the Thermal Hydraulic 1 (TH1) Test Loop into a modernized facility. The existing Thermal Hydraulics Laboratory Loop 84, a steam/water test loop, is operating beyond its design life and cannot meet the strategic long-term needs of future testing. The TH1 Test Loop will allow for testing under prototypic conditions and configurations.
- Procure a state-of-the-art metal Additive Manufacturing (AM) machine to support continued development of AM and enable rapid design iteration of pre-production components.

FY 2021 Accomplishments
- Core design and analyses supported continued safe and reliable operation of reactors across the fleet.
- Performed and coordinated expended core examinations. These examinations determined performance of actual operating naval cores.
- Certified and began use of a new irradiation test specimen transfer cask supporting shipment between the Naval Reactors Facility and the Advanced Test Reactor that was designed to better satisfy modern safety and regulatory shipping requirements.
- Continued development of new manufacturing processes (PM-HIP and AM), executing targeted material testing to validate key performance attributes in a shorter time than prior material qualification efforts.
- Designed and built a prototype compact heat exchanger for use in performance testing.
- Initiated integrated work plan for next generation reactor fuel system, including initiation of vendor and laboratory scoping work.
- Accelerated the Naval Reactors' advanced technology incubator effort to develop technologies that enable a step-change in competitive advantage for naval nuclear propulsion plants.
- Performed operations, maintenance and engineering support work for the ATR including two 60-day irradiation test cycles and initiated Core Internals Changeout, a once-per-decade maintenance effort on the ATR that will be completed in FY 2022.
- Safely shipped and received six Naval Reactors program irradiation test trains.
- Suspended Enhanced Lifetime Element fuel development and initiated new fuel concept development.

Naval Reactors
S8G Prototype Refueling

Description
The land-based prototype located at the Kesselring Site in West Milton, New York serves as a critical operating reactor to demonstrate technology advancements for fleet application. The land-based prototype requires a refueling overhaul, which began in FY 2018. Originally built as a prototype for the *Ohio*-class submarine propulsion plant, this testing platform has been integral to the development of technologies used for the *Virginia* Class and *Seawolf* Class, which have resulted in improved performance and reliability while reducing lifecycle costs. Continued operation of this land-based prototype and development of advanced core technology will enable extended core lifetimes, more efficient use of nuclear fuel, greater compactness, and cross-platform adaptability. By constructing the replacement Technology Demonstration Core (TDC) for the prototype with technologies planned for the *Columbia* Class, technical, cost, and schedule risks to the ship construction program will be mitigated. The manufacturing development, technology demonstration, and new core technologies development began in FY 2010.

Overhaul of reactor and steam plant systems will be performed in conjunction with the land-based prototype refueling overhaul. System overhaul includes the required preventative and corrective maintenance to support subsequent plant operations. In addition, establishing critical site infrastructure to support the Land-based Prototype Refueling Overhaul is required to enable safe and efficient execution of the overhaul.

The land-based prototype reactor plant provides a cost-effective test and evaluation platform, for new technologies, materials, and components before they are introduced to the fleet, and a vital training platform for reactor plant operators. To preserve this critical research and development asset for the long-term and to achieve a life-of-ship core for the *Columbia* Class, the refueling overhaul execution effort will be completed in FY 2023 to support operator training and proof-of-concept for the *Columbia* Class core. Naval Reactors requests $20,000,000 for this effort in FY 2023.

Highlights and Major Changes in the FY 2023 Budget Request
The decrease of $115,000,000 is consistent with the project's revised funding profile and supports refueling overhaul execution and completion in early FY 2023.

FY 2021 Accomplishments
- Completed removal of spent nuclear fuel.
- Completed engineering assessments supporting plant modifications.

Naval Reactors
***Columbia*-class Reactor Systems Development**

Description
Ohio-class ballistic missile submarines (SSBNs) have been the backbone of the Nation's sea-based strategic deterrent since the early 1980s. Recapitalization of this strategic asset is required as the *Ohio* Class retires. With the *Columbia* Class, the Navy plans to maintain its sea-based strategic deterrent force with a class of 12 ships, two fewer than today's *Ohio* Class, due in part to a life-of-ship-core. This new life-of-ship core will eliminate the need for mid-life reactor refuelings, overhauls that are an over-three-year evolution during which the ship is unavailable for service. By increasing class operational availability, development of a new reactor plant for the *Columbia* Class will permit 12 *Columbia*-class submarines to do the work of 14 *Ohio*-class submarines–an operational and sustainment savings of over $40 billion over the life of the class.

Research, development, and design for the *Columbia*-class SSBN began in FY 2010. The new design will leverage *Virginia*-class technology, as well as manufacturing development and demonstration efforts being performed as part of the land-based S8G Prototype Refueling Overhaul program. NR must design a new reactor plant to meet the Navy's required capabilities, maximize operational availability, and reduce acquisition and lifecycle costs. The DOE reactor plant design and development work for the *Columbia* will continue in FY 2023 and beyond to include oversight of the manufacture of lead ship reactor plant components including the core, and conduct the requisite safety analysis for the lead ship reactor plant.

Work to support the *Columbia*-class SSBN is tightly synchronized with Navy-funded propulsion plant work. The DOE-funded design work includes reactor plant component design and development, core design analysis and manufacturing development, reactor plant instrumentation and control design and development, reactor plant configuration, reactor systems development and integration, and reactor performance, analysis, and validation. Lead submarine construction began in FY 2021. NR requests $53,900,000 for this effort in FY 2023.

Highlights and Major Changes in the FY 2023 Budget Request
The decrease of $10,800,000 is consistent with the project's planned funding profile and supports FY 2023 production, oversight analysis, and testing execution.

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 2023 Budget Request

The increase for the Naval Reactors Program Direction budget includes general increases for personnel and pay related costs and IT hardware and maintenance. Additionally, NR will continue to reshape the workforce to manage knowledge transfer to ensure the accomplishment of the NR mission.

FY 2024-FY 2027 Key Milestones

- NR plans to continue developing its highly technical workforce to ensure the NR mission is preserved well into the future.

FY 2021 Accomplishments

- Provided for all facets of administrative control and oversight of the Naval Nuclear Propulsion Program ("Naval Reactors"), including developing and overseeing substantial modifications and improvements to management and work policies necessitated by the COVID-19 pandemic.

Naval Reactors
Program Direction Funding

(Dollars in Thousands)

	FY 2021 Enacted	FY 2022 Annualized CR	FY 2023 Request	FY 2023 Request vs FY 2021 Enacted ($)	FY 2023 Request vs FY 2021 Enacted (%)
Naval Reactors					
Headquarters					
Salaries and Benefits	27,877	27,877	31,034	+3,158	11.3%
Travel	480	480	470	-10	-2.1%
Other Related Expenses	2,663	2,663	3,611	+947	35.6%
Total, Headquarters	**31,020**	**31,020**	**35,115**	**+4,095**	**13.2%**
Naval Reactors Laboratory Field Office					
Salaries and Benefits	18,584	18,584	20,690	+2,105	11.3%
Travel	320	320	313	-7	-2.1%
Other Related Expenses	1,776	1,776	2,407	+632	35.6%
Total, Naval Reactors Laboratory Field Office	**20,680**	**20,680**	**23,410**	**+2,730**	**13.2%**
Total Program Direction					
Salaries and Benefits	46,461	46,461	51,724	+5,263	11.3%
Travel	800	800	783	-17	-2.1%
Other Related Expenses	4,439	4,439	6,018	+1,579	35.6%
Total, Program Direction	**51,700**	**51,700**	**58,525**	**+6,825**	**13.2%**
Planned FTEs	**246**	**246**	**246**	**246**	**246**

Naval Reactors
Outyears Program Direction

(Dollars in Thousands)

	FY 2024 Request	FY 2025 Request	FY 2026 Request	FY 2027 Request
Naval Reactors				
Headquarters				
Salaries and Benefits	31,270	32,128	33,011	34,818
Travel	481	491	502	513
Other Related Expenses	3,973	4,354	4,755	5,356
Total, Headquarters	**35,723**	**36,973**	**38,267**	**40,687**
Naval Reactors Laboratory Field Office				
Salaries and Benefits	20,846	21,419	22,007	23,212
Travel	320	327	334	342
Other Related Expenses	2,648	2,903	3,170	3,570
Total, Naval Reactors Laboratory Field Office	**23,815**	**24,649**	**25,512**	**27,124**
Total Program Direction				
Salaries and Benefits	52,116	53,547	55,018	58,030
Travel	801	818	836	855
Other Related Expenses	6,621	7,257	7,925	8,926
Total, Program Direction	**59,538**	**61,622**	**63,779**	**67,811**
Planned FTEs	**246**	**246**	**246**	**252**

Naval Reactors

Program Direction - Other Related Expenses

(Dollars in Thousands)

Other Related Expenses	FY 2021 Enacted	FY 2022 Annualized CR	FY 2023 Request	FY 2023 Request vs FY 2021 Enacted ($)	FY 2023 Request vs FY 2021 Enacted (%)
Transportation	674	674	606	-68	-10.1%
Communications, Utilities and Miscellaneous Charges	359	359	320	-39	-10.9%
Other Services from Federal Sources	588	588	866	+278	47.3%
Advisory and Assistance Services	166	166	175	+9	5.4%
Operation and Maintenance of Facilities	259	259	388	+129	49.8%
Operations and Maintenance of Equipment	631	631	856	+225	35.7%
Supplies and Materials	262	262	480	+218	83.2%
Equipment	751	751	1,878	+1,127	150.1%
Working Capital Fund	749	749	449	-300	-40.1%
Total, Other Related Expenses	**4,439**	**4,439**	**6,018**	**+1,579**	**35.6%**

Outyears Program Direction - Other Related Expenses

(Dollars in Thousands)

Other Related Expenses	FY 2024 Request	FY 2025 Request	FY 2026 Request	FY 2027 Request
Transportation	667	731	798	899
Communications, Utilities and Miscellaneous Charges	351	386	421	474
Other Services from Federal Sources	953	1,044	1,140	1,284
Advisory and Assistance Services	193	211	231	260
Operation and Maintenance of Facilities	427	468	511	576
Operations and Maintenance of Equipment	942	1,032	1,127	1,270
Supplies and Materials	528	578	632	711
Equipment	2,066	2,265	2,474	2,786
Working Capital Fund	494	542	591	666
Total, Other Related Expenses	**6,621**	**7,257**	**7,925**	**8,926**

Program Direction
Activities and Explanation of Changes

FY 2021 Enacted	FY 2023 Request	Explanation of Changes FY 2023 Request vs FY 2021 Enacted
Salaries and Benefits **$46,461,000**	**Salaries and Benefits** **$51,724,000**	**Salaries and Benefits** **+$5,263,000**
• (U) 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.	• (U) 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.	• (U) Reflects an increase for personnel and pay related costs as well as anticipated costs of benefits.
Travel **$800,000**	**Travel** **$783,000**	**Travel** **-$17,000**
• 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.	• Performed 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.	• Decrease reflects expected reduction in travel requirement to execute oversight activities.
Other Related Expenses **$4,439,000**	**Other Related Expenses** **$6,018,000**	**Other Related Expenses** **+$1,579,000**
• 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. • Supported planned upgrades and maintenance of video teleconferencing equipment, security investigation of Federal personnel, and training requirements.	• Increase supports IT and maintenance operations.

Naval Reactors
Capital Summary

(Dollars in Thousands)

	Total	Prior Years	FY 2021 Enacted	FY 2022 Annualized CR	FY 2023 Request	FY 2023 Request vs FY 2021 Enacted ($)
Capital Operating Expenses Summary (including (Major Items of Equipment (MIE))						
Capital Equipment >$500K (including MIE)	N/A	N/A	1,000	7,000	41,600	+40,600
Minor Construction	N/A	N/A	41,405	36,600	49,520	+8,115
Total, Capital Operating Expenses	**N/A**	**N/A**	**42,405**	**43,600**	**91,120**	**+48,715**
Capital Equipment > $500K (including MIE)						
Total Non-MIE Capital Equipment (>$500K and <$5M)	N/A	N/A	1,000	1,500	12,700	+11,700
High Performance Computer (2022 Buy)	5,500	0	0	5,500	0	0
High Performance Computer (2023 Buy)	5,500	0	0	0	5,500	+5,500
High Performance Computer (2024 Buy)	5,500	0	0	0	0	0
High Performance Computer (2025 Buy)	5,500	0	0	0	0	0
High Performance Computer (2026 Buy)	5,500	0	0	0	0	0
High Performance Computer (2027 Buy)	5,500	0	0	0	0	0
RML High Radiation Scanning Electron Microscope Replacement	5,000	0	0	0	5,000	+5,000
E1 Crane Replacement, Extended Core Facility (ECF)	7,000	0	0	0	7,000	+7,000
E4 Crane Replacement, Extended Core Facility (ECF)	7,000	0	0	0	7,000	+7,000
TH1 Test Loop, BL	23,600	0	0	0	4,400	+4,400
M-140 Cranes, Naval Spent Fuel Handling Facility	14,100	0	0	0	0	0
Total, Capital Equipment (including MIE)	**N/A**	**N/A**	**1,000**	**7,000**	**41,600**	**+40,600**

Naval Reactors
Capital Summary

(Dollars in Thousands)

	Total	Prior Years	FY 2021 Enacted	FY 2022 Annualized CR	FY 2023 Request	FY 2023 Request vs FY 2021 Enacted ($)
Minor Construction Projects (Total Estimated Cost (TEC)						
Total Minor Construction Projects (TEC <$5M)	N/A	N/A	6,405	3,944	4,111	-2,294
BL AMTL Upgrade EMTF Infrastructure	7,900	3,580	0	560	3,760	+3,760
BL A7 Office Building	19,000	0	0	19,000	0	0
BL Simulation Development Laboratory and BRES	19,000	0	0	0	19,000	+19,000
BL SVTF/FSVTL	14,600	0	0	0	0	0
BL Craft Facility	19,807	0	0	0	0	0
BL Warehouse Upgrade	8,079	0	0	0	480	+480
KL Legacy Eliminating Office Building	19,000	0	19,000	0	0	-19,000
KL 002 Outfall	7,600	0	0	0	800	+800
KL Radio Upgrade	17,800	0	0	1,000	0	0
KL Data Center Power and Capacity Upgrades	12,911	0	0	1,259	11,652	+11,652
KL RML HVAC Upgrade	12,261	1,945	0	0	0	0
KL RML Building Envelope	6,939	0	0	0	630	+630
KS Storm Water Upgrades	5,207	0	0	0	650	+650
KS Radio Upgrade	17,678	0	0	0	1,603	+1,603
KS CAS Relocation	6,100	445	300	0	5,355	+5,055
KS High Yard 30 Upgrade	11,460	623	0	10,837	0	0
NRF D&D Supporting Infrastructure	15,700	0	15,700	0	0	-15,700
NRF ECF Electric Heat Conversion	13,500	0	0	0	1,000	+1,000
NRF Transporter Path	6,745	0	0	0	479	+479
NRF Integrated Electric Heat Conversion	13,500	0	0	0	0	0
NRF M140 Unloading Station	15,400	0	0	0	0	0
NRF Office Building #3	19,000	0	0	0	0	0
Total, Minor Construction Projects	**N/A**	**N/A**	**41,405**	**36,600**	**49,520**	**+8,115**
Total, Capital Summary	**N/A**	**N/A**	**42,405**	**43,600**	**91,120**	**+48,715**

Naval Reactors
Outyears Capital Summary

(Dollars in Thousands)

	FY 2024 Request	FY 2025 Request	FY 2026 Request	FY 2027 Request	Outyears
Capital Operating Expenses Summary (including (Major Items of Equipment (MIE))					
Capital Equipment >$500K (including MIE)	18,600	29,800	14,000	12,600	N/A
Minor Construction	49,843	71,826	63,044	68,170	N/A
Total, Capital Operating Expenses	**68,443**	**101,626**	**77,044**	**80,770**	**N/A**
Capital Equipment > $500K (including MIE)					
Total Non-MIE Capital Equipment (>$500K and <$5M)	7,300	5,800	6,600	0	N/A
High Performance Computer (2024 Buy)	5,500	0	0	0	0
High Performance Computer (2025 Buy)	0	5,500	0	0	0
High Performance Computer (2026 Buy)	0	0	5,500	0	0
High Performance Computer (2027 Buy)	0	0	0	5,500	0
TH1 Test Loop, BL	5,800	4,400	1,900	7,100	0
M-140 Cranes	0	14,100	0	0	0
Total, Capital Equipment (including MIE)	**18,600**	**29,800**	**14,000**	**12,600**	**N/A**

Naval Reactors
Outyears Capital Summary

(Dollars in Thousands)

	FY 2024 Request	FY 2025 Request	FY 2026 Request	FY 2027 Request	Outyears
Minor Construction Projects (Total Estimated Cost (TEC)					
Total Minor Construction Projects (TEC <$5M)	9,844	10,660	26,180	36,670	N/A
BL SVTF/FSVTL	14,600	0	0	0	0
BL Craft Facility	0	0	19,807	0	0
BL Warehouse Upgrade	7,599	0	0	0	0
KL 002 Outfall	0	6,800	0	0	0
KL Radio Upgrade	16,800	0	0	0	0
KL RML HVAC Upgrade	0	10,316	0	0	0
KL RML Building Envelope	0	6,309	0	0	0
KS Storm Water Upgrades	0	0	4,557		
KS Radio Upgrade	0	16,075	0	0	0
NRF ECF Electric Heat Conversion	0	0	12,500	0	0
NRF Transporter Path	0	6,266	0	0	0
NRF Integrated ECF Electric Heat Conversion	1,000	0	0	12,500	0
NRF M140 Unloading Station	0	15,400	0	0	0
NRF Office Building #3	0	0	0	19,000	0
Total, Minor Construction Projects	**49,843**	**71,826**	**63,044**	**68,170**	**N/A**
Total, Capital Summary	**68,343**	**101,626**	**77,044**	**80,770**	**N/A**

Naval Reactors
Construction Projects Summary
(Dollars in Thousands)

	Total	Prior Years	FY 2021 Enacted	FY 2022 Enacted	FY 2023 Request	FY 2023 Request vs FY 2022 Enacted ($)
26-D-XXX East Side Office Building						
Total Estimated Cost (TEC)	62,851	0	0	0	0	0
Other Project Cost (OPC)	1,489	0	0	598	125	-473
TPC, 26-D-XXX East Side Office Building	**64,340**	**0**	**0**	**598**	**125**	**-473**
25-D-XXX Naval Examination Acquisition Project						
Total Estimated Cost (TEC)	TBD	0	0	0	0	0
Other Project Cost (OPC)	TBD	18,100	11,200	15,100	23,300	+8,200
TPC, 23-D-XXX Naval Examination Acquisition Project	**TBD[a]**	**18,100**	**11,200**	**15,100**	**23,300**	**+8,200**
24-D-XXX KL Central Chiller and Piping						
Total Estimated Cost (TEC)	69,800	0	0	0	0	0
Other Project Cost (OPC)	2,351	0	50	505	61	-444
TPC, 24-D-XXX KL Central Chiller and Piping	**72,151**	**0**	**50**	**505**	**61**	**-444**
24-D-XXX NRF Medical Science Complex						
Total Estimated Cost (TEC)	33,200	0	0	0	0	0
Other Project Cost (OPC)	2,631	1,466	108	108	176	+68
TPC, 24-D-XXX NRF Medical Science Complex	**35,831**	**1,466**	**108**	**108**	**176**	**+68**
24-D-XXX NRF South and West Boundary						
Total Estimated Cost (TEC)	39,700	0	0	0	0	0
Other Project Cost (OPC)	3,114	0	0	1,500	790	-710
TPC, 24-D-XXX NRF South and West Boundary	**42,814**	**0**	**0**	**1,500**	**790**	**-710**

[a] Critical Decision (CD)-0, Mission Need, was approved on January 3, 2018 with a total project cost range of $500,000K to $1,266,000K (FY18 dollars), which is based on a rough-order of magnitude estimate.

23-D-533 BL Component Test Complex						
Total Estimated Cost (TEC)	57,420	0	0	0	57,420	+57,420
Other Project Cost (OPC)	4,826	3,182	500	70	1,054	+984
TPC, 23-D-533 BL Component Test Complex	**62,246**	**3,182**	**500**	**70**	**58,474**	**+58,404**
22-D-532, KL Security Upgrades						
Total Estimated Cost (TEC)	46,800	0	0	5,100	0	-5,100
Other Project Cost (OPC)	2,036	240	9	136	44	-92
TPC, 22-D-532, KL Security Upgrades	**48,836**	**240**	**9**	**5,236**	**44**	**-5,192**
22-D-531, KL Chemistry and Radiological Health Building						
Total Estimated Cost (TEC)	41,620	0	0	41,620	0	-41,620
Other Project Cost (OPC)	4,250	783	170	988	80	-908
TPC, 22-D-531, KL Chemistry and Radiological Health Building	**45,870**	**783**	**170**	**42,608**	**80**	**-42,528**
21-D-530, KL Steam and Condensate Upgrades						
Total Estimated Cost (TEC)	59,000	0	4,000	0	0	0
Other Project Cost (OPC)	3,500	543	275	635	405	-230
TPC, 21-D-530, KL Steam and Condensate Upgrades	**62,500**	**543**	**4,275**	**635**	**405**	**-230**
14-D-901, Spent Fuel Handling Recapitalization Project						
Total Estimated Cost (TEC)	2,159,000	926,300	330,000	400,000	397,845	-2,155
Other Project Cost (OPC)	174,000	174,000	0	0	0	0
TPC, 14-D-901, Spent Fuel Handling Recapitalization Project [ab]	**2,333,000**	**1,100,300**	**330,000**	**400,000**	**397,845**	**-2,155**
Total All Construction Projects						
Total Estimated Cost (TEC)	2,569,391	926,300	334,000	446,720	455,265	+8,545
Other Project Cost (OPC)	198,197	198,314	12,312	19,640	26,035	+6,395
Total Project Cost (TPC) All Construction Projects	**TBD**	**1,124,614**	**346,312**	**466,360**	**481,300**	**+14,940**

[a] The Consolidated and Further Continuing Appropriation Act, 2015 provided funding for Other Project Costs (OPC) within project funds beginning in FY 2015. All prior year funding was OPC.

[b] The total amount of the Spent Fuel Handling Recapitalization Project entries is $2,384,295, but the total is stated as $2,333,000, consistent with the most recent performance baseline. This difference stems from the FY 2022 Enacted amount of $400,000 compared to the FY 2022 Request of $348,705.

Outyears Construction Summary

(Dollars in Thousands)

	FY 2024 Request	FY 2025 Request	FY 2026 Request	FY 2027 Request	Outyears to Completion
26-D-XXX East Side Office Building					
Total Estimated Cost (TEC)	0	0	62,851	0	0
Other Project Cost (OPC)	98	18	530	0	120
TPC, 26-D-XXX East Side Office Building	**98**	**18**	**63,381**	**0**	**120**
25-D-XXX Naval Examination Acquisition Project					
Total Estimated Cost (TEC)	0	60,000	85,000	110,000	TBD
Other Project Cost (OPC)	29,100	32,400	10,200	14,300	TBD
TPC, 23-D-XXX Naval Examination Acquisition Project	**29,100**	**92,400**	**95,200**	**124,300**	**TBD**
24-D-XXX KL Central Chiller and Piping					
Total Estimated Cost (TEC)	4,000	0	0	65,800	0
Other Project Cost (OPC)	55	720	100	530	330
TPC, 24-D-XXX KL Central Chiller and Piping	**4,055**	**720**	**100**	**66,330**	**330**
24-D-XXX NRF Medical Science Complex					
Total Estimated Cost (TEC)	33,200	0	0	0	0
Other Project Cost (OPC)	143	180	200	233	17
TPC, 24-D-XXX NRF Medical Science Complex	**33,343**	**180**	**200**	**233**	**17**
24-D-XXX NRF South and West Boundary					
Total Estimated Cost (TEC)	3,300	0	0	36,400	0
Other Project Cost (OPC)	147	0	0	0	677
TPC, 24-D-XXX NRF South and West Boundary	**3,447**	**0**	**0**	**36,400**	**677**
23-D-533 BL Component Test Complex					
Total Estimated Cost (TEC)	0	0	0	0	0
Other Project Cost (OPC)	0	0	12	8	0
TPC, 23-D-533 BL Component Test Complex	**0**	**0**	**12**	**8**	**0**

22-D-532, KL Security Upgrades					
Total Estimated Cost (TEC)	0	41,700	0	0	0
Other Project Cost (OPC)	237	595	95	47	633
TPC, 22-D-532, KL Security Upgrades	**237**	**42,295**	**95**	**47**	**633**
22-D-531, KL Chemistry and Radiological Health Building					
Total Estimated Cost (TEC)	0	0	0	0	0
Other Project Cost (OPC)	1,990	239	0	0	0
TPC, 22-D-531, KL Chemistry and Radiological Health Building	**1,990**	**239**	**0**	**0**	**0**
21-D-530, KL Steam and Condensate Upgrades					
Total Estimated Cost (TEC)	55,000	0	0	0	0
Other Project Cost (OPC)	740	617	285	0	0
TPC, 21-D-530, KL Steam and Condensate Upgrades	**55,740**	**617**	**285**	**0**	**0**
14-D-901, Spent Fuel Handling Recapitalization Project					
Total Estimated Cost (TEC)	139,250	16,900	0	0	0
Other Project Cost (OPC)	0	0	0	0	0
TPC, 21-D-512, Spent Fuel Handling Recapitalization Project	**139,250**	**16,900**	**0**	**0**	**0**
Total All Construction Projects					
TEC	234,750	118,600	147,851	212,200	0
OPC	32,510	34,769	11,422	15,118	TBD
TPC All Construction Projects	**267,260**	**153,369**	**159,273**	**227,318**	**TBD**

Research and Development

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

(Dollars in Thousands)

	FY 2021 Enacted	FY 2022 Annualized CR	FY 2023 Request	FY 2023 Request vs FY 2021 Enacted ($)	FY 2023 Request vs FY 2021 Enacted (%)
Research and Development (R&D)					
Basic	0	0	0	+0	0%
Applied	0	0	0	+0	0%
Development	1,140,270	1,140,270	1,312,770	+172,500	15%
Subtotal, R&D	**1,140,270**	**1,140,270**	**1,312,770**	**+172,500**	15%
Equipment	1,000	1,000	25,100	+24,100	2410%
Construction	330,000	330,000	455,265	+125,265	38%
Total, R&D	**1,471,270**	**1,471,270**	**1,793,135**	**+321,865**	22%

23-D-533, Component Test Complex (CTC) Project
Bettis Laboratory Site (BLS), West Mifflin, PA
Project is for Design and Construction

1. Summary, Significant Changes, and Schedule and Cost History

Summary

The FY 2023 Request for 23-D-533, Component Test Complex (CTC), is $57,420K for Total Estimated Cost (TEC) activities. The Total Project Cost (TPC) is $62,246K, approved at Critical Decision (CD) CD-3 on February 9, 2022, with a CD-4 of 4Q FY 2027.

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

Significant Changes

This project is a new start in FY2023. The Original Validated Baseline was approved in 2019. Since then, this project incurred a two-year delay as part of NR's FY 2021 efforts to prioritize other major projects. Additionally, following a performance baseline revision, the scope was updated to include consolidation of all Program large-scale thermal and hydraulic testing operations/facilities in the CTC, allowing the retiring of redundant facilities that are no longer required to satisfy long-term Program mission needs.

Critical Milestone History

Fiscal Quarter or Date

Fiscal Year	CD-0	Conceptual Design Complete	CD-1	CD-2	Final Design Complete	CD-3	D&D Complete	CD-4
FY 2023	7/31/2014	11/30/2017	12/5/2017	7/19/2019	3Q FY2024	2/9/2022	N/A	4Q FY2027

CD-0 – Approve Mission Need for a construction project with a conceptual scope and cost range
Conceptual Design Complete – Actual date the conceptual design was completed
CD-1 – Approve 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
D&D Complete –Completion of D&D work
CD-4 – Approve Start of Operations or Project Completion

Project Cost History

(Dollars in Thousands)

Fiscal Year	TEC, Design[a]	TEC, Construction	TEC, Total	OPC Except D&D	OPC, D&D	OPC, Total	TPC
FY 2023	N/A	57,420	57,420	4,826	0	4,826	62,246

2. Project Scope and Justification

Scope

This project will provide a 40,900 square foot consolidated test facility for executing large-scale thermal-hydraulic test programs (a critical technical discipline of the Program) with increased efficiency, greater reliability, and lower operational cost. The project delivers a multi-use complex containing test laboratories and office spaces to support the operating fleet, new reactor and plant features, and new technology development for future applications. This project recapitalizes high usage test facilities that no longer efficiently support the Naval Reactors needs due to their age, design, configuration, and

[a] Design portion of the Design-Build contract is estimated to be approximately $3.3M of the total TEC.

condition. This project also consolidates all large-scale thermal-hydraulic testing at Bettis, eventually retiring redundant facilities at Knolls that are no longer required to satisfy long-term Program mission needs.

Justification

Many test facilities at Naval Nuclear Laboratory (NNL) sites are in old buildings with aging infrastructure that create obstacles to the quick and efficient execution of contemporary test programs. The services in the facility buildings are old; not well documented; inefficient; and expensive to repair, maintain, and modify. An insufficient number of employee offices are located near the labs they support, resulting in test operations not being as efficient and effective as they could be otherwise. Upon completion, this project will enable the repurposing or inactivation of Bettis building H-2, where the Thermal Hydraulics Laboratory is located, once the test loops and support facilities are moved into the new complex.

Key Performance Parameters (KPPs)

The Threshold KPPs, represent the minimum acceptable performance that the project must achieve. Achievement of the Threshold KPPs will be a prerequisite for approval of CD-4, Project Completion. The Objective KPPs represent the desired project performance.

Performance Measure	Threshold	Objective
The project shall provide adaptable connection points for test support utilities that are regularly spaced throughout the facility to allow for straightforward connection to the test loops that are planned to move to the facility (Loop 84, Loop 29, Loop T30, Loop 27E, Loop 28, APWR).	Tie-in connections every 25 feet with tie-in connection defined as a piping branch off the header, a valve, and a leak-proof pipe or tubing end (i.e. plug, cap, blind flange, etc.)	No change
The project shall provide dual electrical power feeds to the new facility to support testing operations. In the event of an unplanned loss of one of the two power feeds, the system will not provide automatic transfer from one feed to another, however, it will provide the ability to manually switch all facility loads to the energized feed and to isolate the de-energized feed. Additionally, when necessary, the system will permit a manual transfer of all the loads to a single feed (without interruption) when preparing for preventative maintenance and repairs on the other feed.	Primary service will be provided from 13.2 KV loop from BMOSS circuit breakers A18 and B15 through seven (7) loop switches. Each of the seven (7) loop switches will be located above the primary disconnect switch of each corresponding pad mounted transformers in the transformer area.	No change
The project shall provide crane access to Loop 84, Loop 29, Loop T30, the main high-bay space including the truck bay, the laser- testing mezzanine, and the assembly room. This will greatly improve the lab's ability to move test sections, test loop piping and vessels, and other large facility components to efficiently assemble test loops and test support systems in the new Laboratory.	Location shall be such that the entire footprint is within the access area of the 20-ton crane bridge and two 20-ton hooks.	No change
The project shall modern, efficiently arranged office areas in close proximity to the test lab. These office spaces will provide optimized work areas for test sponsor engineers, engineers that design and construct the test systems, engineers that oversee testing operations, other support personnel, and the respective managers for each of these groups.	38 office areas	51 office areas

Performance Measure	Threshold	Objective
The project shall provide industrial lab support spaces (chemistry lab, data lab, electronics lab, assembly room, control room, meeting rooms, locker rooms, break room) necessary to support efficient laboratory operations.	All rooms shall be provided per PS requirements.	No change
The project shall provide a new facility that contains rectifiers and a patch panel distribution system to provide uniform DC power for test section heating for thermal hydraulic testing. The patch panel will provide the ability to connect any of the rectifiers to any of the test loops in the lab that utilize DC power.	All specific requirements for DC power system must be met.	No change
The project shall provide an Uninterruptable Power Supply (UPS) system capable of supporting electrical loads associated with process control systems (PCS) and data acquisition systems (DAS). Associated loads will typically include servers, switches, computers, and displays, as well as control and acquisition hardware components.	Provide a three-phase 50 kVA continuous duty, on-line, double conversion, solid- state uninterruptible power system.	No change

3. Financial Schedule

Dollars in Thousands

	Budget Authority (Appropriations)	Obligations	Costs
Total Estimated Cost (TEC)			
Total, Design	**N/A[b]**	**N/A**	**N/A**
Construction			
FY 2023	57,420	57,420	520
FY 2024	0	0	2,652
FY 2025	0	0	21,814
FY 2026	0	0	30,624
FY 2027	0	0	1,810
Total, Construction	**57,420**	**57,420**	**57,420**
Total Estimated Costs			
FY 2023	57,420	57,420	520
FY 2024	0	0	2,652
FY 2025	0	0	21,814
FY 2026	0	0	30,624
FY 2027	0	0	1,810
Total, TEC	**57,420**	**57,420**	**57,420**
Other Project Cost (OPC)			
OPC, except D&D			
FY 2015	446	446	379
FY 2016	424	424	465
FY 2017	762	762	762
FY 2018	430	430	455
FY 2019	1,032	1,032	1,032
FY 2020	88	88	88
FY 2021	500	500	465
FY 2022	70	70	68
FY 2023	1,054	1,054	496
FY 2024	0	0	300
FY 2025	0	0	0
FY 2026	12	12	301
FY 2027	8	8	15
Total OPC, except D&D	**4,826**	**4,826**	**4,826**
OPC, D&D			
Total OPC, D&D	**0**	**0**	**0**

[b] Design portion of the Design-Build contract is estimated to be approximately $3.3M of the total TEC.

	Budget Authority (Appropriations)	Obligations	Costs
Total Other Project Costs			
FY 2015	446	446	379
FY 2016	424	424	465
FY 2017	762	762	762
FY 2018	430	430	455
FY 2019	1,032	1,032	1,032
FY 2020	88	88	88
FY 2021	500	500	465
FY 2022	70	70	68
FY 2023	1,054	1,054	496
FY 2024	0	0	300
FY 2025	0	0	0
FY 2026	12	12	301
FY 2027	8	8	15
Total, OPC	**4,826**	**4,826**	**4,826**
Total Project Cost (TPC)			
FY 2015	446	446	379
FY 2016	424	424	465
FY 2017	762	762	762
FY 2018	430	430	455
FY 2019	1,032	1,032	1,032
FY 2020	88	88	88
FY 2021	500	500	465
FY 2022	70	70	68
FY 2023	58,474	58,474	1,016
FY 2024	0	0	2,952
FY 2025	0	0	21,814
FY 2026	12	12	30,925
FY 2027	8	8	1,825
Grand Total	**62,246**	**62,246**	**62,246**

4. Details of Project Cost Estimate

Overall Project

(Budget Authority in Thousands of Dollars)

	Current Total Estimate	Previous Total Estimate	Original Validated Baseline [c]
Total Estimated Cost (TEC)			
Design			
Total, Design [d]	**N/A**	**N/A**	**N/A**
Construction			
Construction	48,118	N/A	34,800
Construction Support	2,944	N/A	2,200
Equipment	28	N/A	65
Contingency	6,330	N/A	7,235
Total, Construction	**57,420**	**N/A**	**44,300**
Total Estimated Cost	**57,420**	**N/A**	**44,300**
Contingency, TEC	*6,330*	*N/A*	*7,235*
Other Project Cost (OPC)			
OPC except D&D			
Pre-Conceptual Design	743	N/A	743
Conceptual Design	1,100	N/A	1,100
Performance Specification	983	N/A	1,000
Other OPC Costs	2,000	N/A	4,380
Contingency	0	N/A	0
Total, OPC	4,826	N/A	7,223
Contingency, OPC	*0*	*N/A*	*0*
Total Project Cost	**62,246**	**N/A**	**51,523**
Total Contingency (TEC+OPC)	**6,330**	**N/A**	**7,235**

[c] The Original Validated Baseline was approved in 2019. Since then, this project incurred a two-year delay as part of NR's FY2021 prioritization efforts to finance other major projects. Additionally, the scope was updated to include consolidation of all Program large-scale thermal and hydraulic testing operations/facilities in the CTC, allowing the retiring of redundant facilities that are no longer required to satisfy long-term Program mission needs.

[d] Design portion of the Design-Build contract is estimated to be approximately $3.3M of the total TEC.

5. Schedule of Appropriations Requests

(Dollars in Thousands

Request Year	Type	Prior Years	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	Outyears	Total
FY 2023	TEC	0	0	0	57,420	0	0	0	0	0	57,420
	OPC	3,182	500	70	1,054	0	0	12	8	0	4,826
	TPC	3,182	500	70	58,474	0	0	12	8	0	62,246

6. Related Operations and Maintenance Funding Requirements

Start of Operation or Beneficial Occupancy	4Q FY2026
Expected Useful Life	50 years
Expected Future Start of D&D of this Capital Asset	1Q FY2076

Related Funding Requirements
(Budget Authority in Millions of Dollars)

	Annual Costs		Life Cycle Costs	
	Previous Total Estimate	Current Total Estimate	Previous Total Estimate	Current Total Estimate
Operations and Maintenance	1.1	1.1	55.0	55.0

7. D&D Information

The new area being constructed is replacing existing facilities, however, the costs of D&D of the existing facilities that are being replaced are not included in the costs of this construction project as these are not within the footprint of the construction area.

	Square Feet
New area being constructed by this project at site	40,900
Area of D&D in this project at site	0
Area at site to be transferred, sold, and/or D&D outside the project including area previously "banked"	39,986
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"	914
Total area eliminated	40,900

8. Acquisition Approach

This project will be executed as a design-build project.

14-D-901, Spent Fuel Handling Recapitalization Project
Naval Reactors Facility, Idaho
Project is for Design and Construction

1. Summary, Significant Changes, and Schedule and Cost History

Summary

The FY 2023 Request for 14-D-901, Spent Fuel Handling Recapitalization Project is $397,845K of Total Project Cost (TPC) funding. The FY 2023 budget request of $398M will enable the project to continue permanent construction activities such as erecting the structural steel, placing the water pool concrete, and procuring the utility systems. Further, this budget request supports the project's ability to manage continuation of volatile economic conditions that are expected to impact pricing of remaining subcontracts, in addition to managing execution of challenging construction sequences. Critical Decision (CD)-2/3, Performance Baseline and Start of Permanent Construction, was approved on September 24, 2018 with a total project cost (TPC) of $1,686,500K and a CD-4 of 3Q FY 2025. On October 31, 2019, a revision to the Performance Baseline was approved with a TPC of $2,060,000K and a CD-4 date of 3Q FY 2026. On July 13, 2021, a second revision to the Performance Baseline was approved with a TPC of $2,333,000K and a CD-4 date of 3Q FY 2026.

Significant Changes

This Construction Project Data Sheet (CPDS) is an update of the FY 2022 CPDS and does not include a new start for the budget year.

The impacts from economic conditions on current and future construction subcontracts compounded by efforts to address differing site conditions resulted in a cost increase for the Project in FY 2021. Notably, market conditions influenced by the pandemic tangibly impacted major procurement actions in FY 2021 resulting in costs that exceeded Project estimates. The pandemic also introduced work delays on active construction subcontracts, requiring additional resources to maintain the Project schedule. Considerable uncertainty remains with how the pandemic-influenced market conditions will impact future construction subcontract costs; additional funding is requested to address this uncertainty. In addition, the degree of variability in the bedrock surface revealed upon the completion of mass excavation activities in FY 2020 was higher than predicted by the Project, complicating the turnover of the construction site to a major construction subcontractor and the initial work in the excavation. Actions to recover from the differing site conditions were complicated by the pandemic, the onset of which coincided with the Project's discovery of the site conditions. In response to these challenges, Naval Reactors approved a revision to the Performance Baseline in July 2021 with a TPC of $2,333,000K. Naval Reactors did not change the CD-4 date of 3Q FY2026 or Project scope with the revision. Consistent with the revision, the CPDS has been updated to reflect the required funding profile through Project Closeout (FY 2027), including the required annual appropriations, obligations, and costs. In addition, the CPDS documents an increase to the Total Estimated Cost for Design to reflect actual design costs incurred through FY 2021 and a re-categorization of ~$37,000K in costs incurred in FY 2019 from the construction to the design cost category to more accurately reflect the use of these funds for design activities.

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

Critical Milestone History

(Fiscal Quarter or Date)

Fiscal Year	CD-0	Conceptual Design Complete	CD-1	CD-2	Final Design Complete	CD-3	D&D Complete [a]	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[b]	03/29/2008		1Q FY 2015	3Q FY 2017	4Q FY 2018	1Q FY 2018	N/A	4Q FY 2024
FY 2016[c]	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
FY 2018	03/29/2008	03/19/2015	03/19/2015	4Q FY 2018[e]	3Q FY 2020	4Q FY 2018	N/A	3Q FY 2025
FY 2019	03/29/2008	03/19/2015	03/19/2015	4Q FY 2018	3Q FY 2020	4Q FY 2018	N/A	3Q FY 2025
FY 2020	03/29/2008	03/19/2015	03/19/2015	09/24/2018	3Q FY 2020	09/24/2018	N/A	3Q FY 2025
FY 2021	03/29/2008	03/19/2015	03/19/2015	09/24/2018	2Q FY 2021[f]	09/24/2018	N/A	3Q FY 2026[f]
FY 2022	03/29/2008	03/19/2015	03/19/2015	09/24/2018	03/04/2021	09/24/2018	N/A	3Q FY 2026
FY 2023	03/29/2008	03/19/2015	03/19/2015	09/24/2018	03/04/2021	09/24/2018	N/A	3Q FY 2026

CD-0 – Approve Mission Need
Conceptual Design Complete – Actual date the conceptual design was completed
CD-1 – Approve Alternate Selection and Cost Range
CD-2 – Approve Performance Baseline
Final Design Complete – Actual date the facility design was completed
CD-3 – Approve Start of Construction/Execution
D&D Complete – Completion of D&D work (see Section 5)
CD-4 – Approve Start of Operations or Project Completion

(Fiscal Quarter or Date)

Fiscal Year	CD-3A	CD-3B	CD-4A
FY 2017	2Q FY 2017	1Q FY2018	3Q FY 2024
FY 2018	12/7/2016	4Q FY 2017	3Q FY 2024
FY 2019	12/7/2016	6/14/2017	3Q FY 2024
FY 2020	12/7/2016	6/14/2017	3Q FY 2024
FY 2021	12/7/2016	6/14/2017	3Q FY 2025[f]
FY 2022	12/7/2016	6/14/2017	3Q FY 2025
FY 2023	12/7/2016	6/14/2017	3Q FY 2025

CD-3A – Start of Long Lead Material Procurement
CD-3B – Start of Early Site Preparation
CD-4A – Start of M-290 Shipping Container Unloading Operations

[a] D&D is not within the scope of this project.
[b] The FY 2015 Revision incorporated the expected impacts of the Consolidated Appropriations Act, 2014 funding reductions.
[c] The FY 2016 CPDS incorporated the impacts from the FY 2015 delayed appropriation.
[d] The FY 2017 CPDS incorporated a phased design.
[e] The FY 2018 CPDS revised the CD-2 milestone date to be consistent with revisions to DOE Order 413.3.
[f] The FY 2021 CPDS revised the dates for final design complete, CD-4A, and CD-4 to reflect the October 2019 Performance Baseline revision.

Project Cost History

(Dollars in Thousands)

Fiscal Year	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[a]	263,000	1,144,900	1,407,000	178,200	N/A	178,200	1,586,100
FY 2016[b]	268,800	1,182,100	1,450,900	195,600	N/A	195,600	1,646,500
FY 2017[c]	239,800	1,232,600	1,472,400	174,100	N/A	174,100	1,646,500
FY 2018	239,800	1,232,600	1,472,400	174,100	N/A	174,100	1,646,500
FY 2019[d]	306,982	1,165,418	1,472,400	174,100	N/A	174,100	1,646,500
FY 2020[e]	302,489	1,169,911	1,472,400	174,100	N/A	174,100	1,686,500[f]
FY 2021[g]	278,860	1,607,140	1,886,000	174,000	N/A	174,000	2,060,000
FY 2022	276,896	1,609,104	1,886,000	174,000	N/A	174,000	2,060,000
FY 2023[h]	332,288	1,826,712	2,159,000	174,000	N/A	174,000	2,333,000

2. Project Scope and Justification

Scope

The Spent Fuel Handling Recapitalization Project will design and construct a new facility, the Naval Spent Fuel Handling Facility, to incorporate the capabilities for naval spent nuclear fuel handling that currently exist in the Expended Core Facility and its support facilities. Additionally, a major portion of this new facility is required to support additional capability, which does not exist in the Expended Core Facility, to handle full-length aircraft carrier naval spent nuclear fuel received in M-290 shipping containers. The Naval Spent Fuel Handling Facility footprint will be approximately 213,000 square feet. Of this, approximately 121,000 square feet is required for spent fuel shipping container and dry storage operations, which includes approximately 17,000 square feet for water pool spent fuel preparation and in-process storage. The remainder of the facility, approximately 92,000 square feet, is required for waste management, facility systems operations, staging, and administrative office space. The Spent Fuel Handling Recapitalization Project has completed the final design, site preparation has completed, and permanent construction has begun.

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, where appropriate.
- Provide the new capability to unload M-290 spent fuel shipping containers.
- Prepare testing, operating, and preventive maintenance procedures and drawings, where appropriate, for the naval spent nuclear fuel handling process systems, equipment, facilities, and facility systems.
- Develop training programs and conduct personnel training, where appropriate.
- Develop project management procedures and manage Project activities.
- Provide support services needed for the Project.

[a] The FY 2015 Revision incorporated the expected impacts of the Consolidated Appropriations Act, 2014 funding reductions.

[b] The FY 2016 CPDS incorporated the impacts from the FY 2015 delayed appropriation.

[c] Divisions between cost categories were updated based on progression of the Project designs and CD-1 completion.

[d] Divisions between cost categories were updated to account for the phased design.

[e] Divisions between cost categories were updated based on establishment of the Performance Baseline in September 2018.

[f] The total amount of the entries in this row is $1,646,500, but the total is stated as $1,686,500 to reflect the TPC that was established with the CD-2/3 Performance Baseline. The additional $40M was first reflected in the FY 2021 CPDS.

[g] The FY 2021 CPDS revised the TEC, OPC, and TPC to reflect the October 2019 Performance Baseline Revision and included the $40M funding requirement from the initial Performance Baseline that was not reflected in the FY 2020 CPDS.

[h] The FY 2023 CPDS revised the TEC, OPC, and TPC to reflect the July 2021 Performance Baseline Revision.

- Manage subcontracts supporting the design and construction.
- Prepare an Environmental Impact Statement in accordance with the National Environmental Policy Act.

Justification

The mission of Naval Reactors is to provide the nation with militarily effective nuclear propulsion plants and to ensure their safe, reliable, long-lived, and affordable operation. Naval Reactors maintains total responsibility for all aspects of the U.S. Navy's nuclear propulsion systems, including research, design, construction, testing, operation, maintenance, and disposal. At the end of reactor service life, Naval Reactors transports naval spent nuclear fuel from its origin (e.g., servicing shipyards and naval training platforms) to the Naval Reactors Facility at the Idaho National Laboratory.

The Expended Core Facility, located at the Naval Reactors Facility in Idaho, is the only facility with the capabilities to receive naval spent nuclear fuel shipping containers and process naval spent nuclear fuel. Although the existing Expended Core Facility continues to be maintained and operated in a safe and environmentally responsible manner, the infrastructure is over 60 years old, does not meet current standards (i.e., requirements that were not applicable at the time of construction), and requires recapitalization. The Expended Core Facility is also incapable of receiving full-length aircraft carrier naval spent nuclear fuel, which is required to support aircraft carrier refuelings. The magnitude of required sustainment efforts and incremental infrastructure upgrades within the Expended Core Facility pose substantial risk to the continued preparation of naval spent nuclear fuel for long term storage. Specifically, sustainment efforts could require delays to naval spent nuclear fuel shipping container unloading operations, which would interrupt refueling and defueling schedules for nuclear-powered vessels and would adversely affect the operational availability of the nuclear fleet. If this interruption were to extend over long periods of time, the ability to sustain fleet operations would be impacted, resulting ultimately in a significant decrement to the Navy's responsiveness and agility to fulfill military missions worldwide.

The existing Expended Core Facility at the Naval Reactors Facility in Idaho is a single facility that is approximately 197,000 square feet. However, other facilities at the Naval Reactors Facility support operations within the Expended Core Facility and include additional areas for administrative support and warehouse storage. The Expended Core Facility has two major capabilities: (1) to receive, unload, prepare, and package naval spent nuclear fuel, and (2) to conduct examinations of naval spent nuclear fuel and irradiation test specimens from the Advanced Test Reactor.

Actions necessary to continue Naval Reactors' ability to support naval spent nuclear fuel handling were the subject of an Environmental Impact Statement. The Final Environmental Impact Statement for recapitalization of the infrastructure supporting naval spent nuclear fuel was published on September 30, 2016 and included an assessment of the environmental impacts associated with handling of naval spent nuclear fuel for the following alternatives:

(1) No Action Alternative – Maintain the naval spent nuclear fuel handling capabilities of the existing Expended Core Facility by continuing to use the existing infrastructure while performing corrective maintenance and repairs.
(2) Overhaul Alternative – Recapitalize the naval spent nuclear fuel handling capabilities of the Expended Core Facility by overhauling the existing facility with major refurbishment projects for the infrastructure and water pools.
(3) New Facility Alternative, including the Spent Fuel Handling Recapitalization Project – Recapitalize the naval spent nuclear fuel handling capabilities of the Expended Core Facility by constructing and operating a new facility at one of two potential locations at the Naval Reactors Facility in Idaho.

The National Environmental Policy Act Record of Decision, which identified the New Facility Alternative as the preferred method to recapitalize the naval spent nuclear fuel handling capabilities of the Expended Core Facility, was published on December 5, 2016.

Naval Reactors has an equivalency to the project management requirements in DOE Order 413.3, *Program and Project Management for the Acquisition of Capital Assets*. The Project is being conducted in accordance with the Naval Reactors Implementation Bulletin for DOE O 413.3, and appropriate project management requirements have been met.

Prior to CD-2/3 approval, an independent cost estimate was completed by the Department of Defense Office of Cost Assessment and Program Evaluation.

Key Performance Parameters (KPPs)

The Threshold KPPs represent the minimum acceptable performance that the project must achieve. Achievement of the Threshold KPPs will be a prerequisite for approval of CD-4, Project Completion. The KPPs were formally established as part of the Performance Baseline and approval of CD-2/3.

Performance Measure	Threshold	Objective
Provide the facility (infrastructure) to receive, unload, prepare, and package full-length aircraft carrier and submarine naval spent nuclear fuel.	An approximately 185,000 square foot facility, which includes an approximate 15,000 square foot water pool.	An approximately 245,000 square foot facility, which includes an approximate 20,000 square foot water pool.
Provide equipment to receive and unload naval spent nuclear fuel.	Receive and unload 7 M-290 shipping containers per year.	Receive and unload 9 M-290 and 12 M-140 shipping containers per year.
Provide equipment to initially inspect and prepare naval spent nuclear fuel for ultimate disposal.	Initially inspect and prepare 62 full-length NIMITZ Class aircraft carrier spent nuclear fuel modules per year.	Initially inspect and prepare 96 full-length aircraft carrier and 64 submarine spent nuclear fuel modules per year.
Provide equipment to package naval spent nuclear fuel into canisters for dry storage.	Package 6 naval spent fuel canisters per year.	Package 10 naval spent fuel canisters per year.
Provide equipment to temporarily store naval spent nuclear fuel in the water pool.	Storage for 126 full-length NIMITZ Class aircraft carrier spent nuclear fuel modules.	Storage for 408 aircraft carrier and submarine spent nuclear fuel modules.
Provide equipment to manage remote-handled low level waste generated from receiving, unloading, preparing, and packaging spent nuclear fuel.	Package and ship 9 remote-handled low level waste canisters per year.	Package and ship 20 remote-handled low level waste canisters per year.

3. Project Cost and Schedule

Financial Schedule

(Dollars in Thousands)

	Budget Authority (Appropriations)[ab]	Obligations[a]	Costs
Total Estimated Cost (TEC)			
Design			
FY 2015	N/A	N/A	19,542
FY 2016	N/A	N/A	56,846
FY 2017	N/A	N/A	65,964
FY 2018	N/A	N/A	78,704
FY 2019	N/A	N/A	62,026
FY 2020	N/A	N/A	32,263
FY 2021	N/A	N/A	16,943
Total, Design	N/A	N/A	332,288
Construction			
FY 2017	N/A	N/A	1,867
FY 2018	N/A	N/A	11,530

[a] Due to the Consolidated and Further Continuing Appropriations Act, 2015, the TEC and OPC appropriations/obligations for FY 2015 and beyond are combined into the TPC appropriations/obligations.

[b] The total amount of the SFHP Project entries is $2,384,295, but the total is stated as $2,333,000, consistent with the most recent performance baseline. This difference is reflective of the FY22 Enacted amount of $400,000 compared to the request of $348,705.

	Budget Authority (Appropriations)[ab]	Obligations[a]	Costs
FY 2019	N/A	N/A	66,979
FY 2020	N/A	N/A	138,986
FY 2021	N/A	N/A	242,454
FY 2022	N/A	N/A	473,945
FY 2023	N/A	N/A	542,387
FY 2024	N/A	N/A	311,589
FY 2025	N/A	N/A	28,720
FY 2026	N/A	N/A	8,255
Total Construction	N/A	N/A	1,826,712
TEC			
FY 2015	N/A	N/A	19,542
FY 2016	N/A	N/A	56,846
FY 2017	N/A	N/A	67,831
FY 2018	N/A	N/A	90,234
FY 2019	N/A	N/A	129,005
FY 2020	N/A	N/A	171,249
FY 2021	N/A	N/A	259,397
FY 2022	N/A	N/A	473,945
FY 2023	N/A	N/A	542,387
FY 2024	N/A	N/A	311,589
FY 2025	N/A	N/A	28,720
FY 2026	N/A	N/A	8,255
Total, TEC	N/A	N/A	2,159,000
Other Project Cost (OPC)			
FY 2010	6,600	6,600	6,372
FY 2011	36,100	36,100	31,168
FY 2012	25,200	25,200	29,420
FY 2013	29,000	29,000	27,172
FY 2014	25,400	25,400	28,017
FY 2015	N/A	N/A	8,514
FY 2016	N/A	N/A	1,567
FY 2017	N/A	N/A	1,990
FY 2018	N/A	N/A	3,448
FY 2019	N/A	N/A	2,658
FY 2020	N/A	N/A	3,616
FY 2021	N/A	N/A	2,949
FY 2022	N/A	N/A	5,135
FY 2023	N/A	N/A	6,186
FY 2024	N/A	N/A	5,786
FY 2025	N/A	N/A	4,319
FY 2026	N/A	N/A	4,026
FY 2027	N/A	N/A	1,657
Total, OPC	N/A	N/A	174,000
Total Project Cost (TPC)			
FY 2010	6,600	6,600	6,372
FY 2011	36,100	36,100	31,168
FY 2012	25,200	25,200	29,420

	Budget Authority (Appropriations)[ab]	Obligations[a]	Costs
FY 2013	29,000	29,000	27,172
FY 2014	25,400	25,400	28,017
FY 2015	70,000	70,000	28,056
FY 2016	86,000	86,000	58,413
FY 2017	100,000	100,000	69,821
FY 2018	197,000	197,000	93,682
FY 2019	287,000	287,000	131,663
FY 2020	238,000	238,000	174,865
FY 2021	330,000	330,000	262,346
FY 2022	400,000	348,705	479,080
FY 2023	397,845	397,845	548,573
FY 2024	139,250	139,250	317,375
FY 2025	16,900	16,900	33,039
FY 2026	0	0	12,281
FY 2027	0	0	1,657
Grand Total	2,333,000	2,333,000	2,333,000

4. Details of Project Cost Estimate

(Budget Authority in Thousands of Dollars)

	Current Total Estimate	Previous Total Estimate[a]	Original Validated Baseline
Total Estimated Cost (TEC)			
Design			
Design	332,288	275,896	300,789
Contingency	0	1,000	1,700
Total, Design	332,288	276,896	302,489
Construction			
Long Lead Material and Site Preparation	57,010	57,010	41,148
Spent Fuel Handling Equipment	224,354	224,354	215,454
Facility Construction	1,346,500	1,268,221	845,841
Contingency	198,848	59,519	107,468
Total, Construction	1,826,712	1,609,104	1,209,911
Total Estimated Cost	2,159,000	1,886,000	1,512,400
Contingency, TEC	198,848	60,519	109,168
Other Project Cost (OPC)			
Conceptual Planning	37,540	37,540	37,540
Conceptual Design	99,427	99,427	99,427
Start-up	20,852	20,852	26,273
Other (e.g., EIS, Project Reviews)	12,029	12,029	7,301
Contingency	4,152	4,152	3,559
Total, OPC	174,000	174,000	174,100
Contingency, OPC	4,152	4,152	3,559
Total Project Cost	2,333,000	2,060,000	1,686,500
Total, Contingency (TEC+OPC)	203,000	64,671	112,727

[a] Previous Total Estimate is from the FY 2022 CPDS.

5. Schedule of Appropriation Requests

(Dollars in Thousands)

Request Year	Type	Prior Years	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	Total
FY 2014	TEC	1,235,800	50,700	0	0	0	0	0	1,286,500
	OPC	155,700	9,300	0	0	0	0	0	165,000
	TPC	1,391,500	60,000	0	0	0	0	0	1,451,500
FY 2015	TEC	1,235,800	50,700	0	0	0	0	0	1,286,500
	OPC	155,700	9,300	0	0	0	0	0	165,000
	TPC	1,391,500	60,000	0	0	0	0	0	1,451,500
FY 2015 Rev	TEC	1,288,100	66,900	33,200	19,700	0	0	0	1,407,900
	OPC	150,400	6,700	7,900	9,600	3,600	0	0	178,200
	TPC	1,438,500	73,600	41,100	29,300	3,600	0	0	1,586,100
FY 2016	TEC	1,165,800	186,100	54,800	24,500	19,700	0	0	1,450,900
	OPC	158,700	6,900	7,200	8,500	10,300	4,000	0	195,600
	TPC	1,324,500	193,000	62,000	33,000	30,000	4,000	0	1,646,500
FY 2017	TEC	1,175,500	186,700	57,300	29,300	23,600	0	0	1,472,400
	OPC	149,800	6,300	4,400	3,600	6,200	3,800	0	174,100
	TPC	1,325,300	193,000	61,700	32,900	29,800	3,800	0	1,646,500
FY 2018	TEC	1,189,500	186,700	43,300	29,300	23,600	0	0	1,472,400
	OPC	149,800	6,300	4,400	3,600	6,200	3,800	0	174,100
	TPC	1,339,300	193,000	47,700	32,900	29,800	3,800	0	1,646,500
FY 2019[a]	TEC	N/A	N/A	N/A	N/A	N/A	N/A	0	1,472,400
	OPC	N/A	N/A	N/A	N/A	N/A	N/A	0	174,100
	TPC	1,339,300	193,000	47,700	32,900	29,800	3800	0	1,646,500
FY 2020	TEC	N/A	N/A	N/A	N/A	N/A	N/A	0	1,472,000
	OPC	N/A	N/A	N/A	N/A	N/A	N/A	0	174,100
	TPC	1,339,300	193,000	47,700	32,900	29,800	3,800	0	1,686,500[b]
FY 2021	TEC	N/A	N/A	N/A	N/A	N/A	N/A	0	1,886,000
	OPC	N/A	N/A	N/A	N/A	N/A	N/A	0	174,000
	TPC	1,430,300	193,000	64,400	32,900	13,100	3,800	0	2,060,000[c]

[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. For clarity, the FY2019 CPDS was updated to reflect appropriations only at the Total Project Cost level.

[b] The total amount of the entries is $1,646,500, but the total is stated as $1,686,500 to reflect the TPC that was established with the CD-2/3 Performance Baseline. The additional $40 million was first reflected in the FY 2021 CPDS.

[c] The total amount of the entries is $1,737,500, but the total is stated as $2,060,000 to reflect the TPC that was established with the October 2019 Performance Baseline Revision. The FY 2021 appropriation request included requirement updates through FY 2021 only, including the $40M funding requirement with an additional $51M requirement to implement the Performance Baseline revision. The FY 2021 appropriation schedule also included a shift of $16.7M from FY 2025 to FY 2023 from the initial Performance Baseline that was not reflected in the FY 2020 CPDS.

(dollars in thousands)

Request Year	Type	Prior Years	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	Total
FY 2022	TEC	N/A	N/A	N/A	N/A	N/A	N/A	1,886,000
	OPC	N/A	N/A	N/A	N/A	N/A	N/A	174,000
	TPC	1,430,300	348,705	157,845	106,250	16,900	0	2,060,000
FY 2023 [ab]	TEC	N/A	N/A	N/A	N/A	N/A	N/A	2,159,000
	OPC	N/A	N/A	N/A	N/A	N/A	N/A	174,000
	TPC	1,430,300	400,000	397,845	139,250	16,900	0	2,333,000

6. Related Operations and Maintenance Funding Requirements

Start of Operation of Beneficial Occupancy	4Q FY 2025
Expected Useful Life	40 years
Expected Future Start of D&D	4Q FY 2065

Related Funding Requirements
(Budget Authority in Thousands of Dollars)

	Annual Costs		Life Cycle Costs	
	Previous Total Estimate	Current Total Estimate	Previous Total Estimate	Current Total Estimate
Operations and Maintenance	166.4	166.4	6,656	6,656

7. D&D Information

The new area being constructed in this project is replacing existing facilities. However, spent fuel handling operations in the existing Expended Core Facility will overlap with operations in the new Naval Spent Fuel Handling Facility for a period of 5 to 12 years, and examination operations in the existing Expended Core Facility will continue for the foreseeable future; therefore, the costs associated with D&D of the Expended Core Facility are not included in the costs cited for the Spent Fuel Handling Recapitalization Project.

	Square Feet
New area being constructed by this Project at the Naval Reactors Facility	213,000
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

[a] Consistent with the July 2021 Performance Baseline Revision, the FY 2023 CPDS has been updated to reflect the required funding profile through Project Closeout (FY 2027).

[b] The total amount of the SFHP Project entries is $2,384,295, but the total is stated as $2,333,000, consistent with the most recent performance baseline. This difference is reflective of the FY 2022 Enacted amount of $400,000 compared to the request of $348,705. NNSA will re-evaluate the outyear funding profile for this project as part of the FY 2024 Budget process.

8. Acquisition Approach

The integrated Management & Operating (M&O) prime partners will plan and execute the Spent Fuel Handling Recapitalization Project in accordance with requirements. Naval spent nuclear fuel handling equipment will be procured through the procurement M&O partners. An Engineering, Procurement, and Construction Management (EPCM) firm was selected as the subcontracting strategy for design and construction management of the facility and facility systems. A 2019 amendment to the EPCM's contract changed the contract type from cost plus fixed fee to cost plus incentive fee, reflecting the maturing design and the improved certainty in Project costs and schedules. Long-lead materials were purchased and site preparation work was performed ahead of CD-2/3.