Isotope R&D and Production

Overview

The Office of Isotope R&D and Production (IRP), also known as the DOE Isotope Program (DOE IP), is essential for maintaining American leadership in isotope production, which directly impacts our national security, scientific progress, medical advancements, and industrial competitiveness. The program's mission is to ensure American dominance in isotope production through a multi-faceted strategy that includes securing a reliable domestic supply, fortifying critical infrastructure, achieving U.S. science supremacy, and ensuring American isotope independence.

Isotopes produced by the IRP are strategically important to the Nation, serving as essential components across diverse and critical sectors. They are indispensable for advancing medical diagnostics and treatments, strengthening national security, propelling advanced manufacturing, revolutionizing quantum information science (QIS), supporting semiconductor manufacturing, facilitating space exploration, driving industrial applications, enabling groundbreaking scientific discoveries, enhancing communications, advancing biological research, and fueling other crucial technological advancements.

Currently, domestic capacity to fully satisfy market demand for these essential isotopes is lacking, creating strategic vulnerabilities due to reliance on nations identified as sensitive. The IRP often stands as the sole, or one of a select few, global producers, positioning the U.S. as a crucial provider of essential commodities both domestically and globally. To continue this leadership role, the IRP champions research in nuclear and radiochemistry, chemical separations, accelerator and reactor physics, and innovative isotope enrichment techniques. These efforts ensure that the U.S. is first to market with new isotope products and maintains a reliable production of priority radioactive and enriched stable isotopes.

To produce isotopes, the IRP strategically manages the irradiation of targets, utilizing particle accelerators and nuclear research reactors across national laboratories and domestic universities. Following irradiation, these targets undergo specialized chemical processing within dedicated radiological or nuclear facilities, equipped with sophisticated equipment, to extract radioisotopes of critical interest. In addition to the direct production of these isotopes, the IRP also recovers radioisotopes from legacy waste streams, used nuclear fuel, and existing inventories, achieving the dual benefit of reducing waste volumes while generating valuable products.

A significant aspect of managing these resources includes overseeing the national repository of stable isotopes, a legacy of the Manhattan Project's calutrons. The limited nature of this inventory increases the United States' reliance on foreign suppliers, primarily Russia, for crucial materials. The IRP is dedicated to developing modern stable isotope enrichment capabilities, revitalizing domestic manufacturing, replenishing critical inventories, and fostering U.S. economic resilience, prosperity, competitiveness, and self-reliance. This initiative aligns with the Administration's goals for a secure and robust domestic supply chain. Furthermore, the IRP serves as the steward of national isotope inventories beyond DOE's legacy repository, including helium-3 (He-3), vital for a multitude of applications including cryogenics, quantum information science, fusion energy research, and national security.

To drive America to the forefront of global isotope dominance, the IRP drives a world-leading research program focused on breakthrough isotope production, enrichment, and chemical separation technologies. The program's isotope manufacturing and R&D activities yield significant collateral benefits through training and workforce development. These efforts cultivate future domestic expertise in nuclear medicine, accelerator science, nuclear engineering, nuclear physics, isotope enrichment, and radiochemistry – disciplines vital not only to isotope production and processing but also to basic and applied nuclear and radiochemical science. In particular, research and production activities develop and employ techniques and platform technologies in artificial intelligence (AI), machine learning (ML), autonomization, microelectronics, robotics, and advanced manufacturing.

As a Mission Essential Function for the DOE Office of Science, the IRP maintains continuous operations of both the inventories and production facilities to effectively mitigate disruptions in isotope supply chains during

national emergencies. Revenue generated from customer sales directly supports the production and distribution of isotopes, as well as related technical services. Isotopes sold to commercial customers and allied foreign partners are priced at full-cost recovery or market price (whichever is higher), fostering sustainable program operations. To further incentivize innovation and scientific advancements, isotope pricing for domestic research is strategically reduced. Furthermore, the Office works closely with industry partners to provide a steady availability of isotopes, fostering their economic stability and growth, with a focus on commercialization of isotope production within the domestic private sector, promoting innovation and strengthening the national supply chain.

Highlights of the FY 2026 Request

The IRP FY 2026 Request for $162.3 million represents a decrease of $7.3 million below the FY 2025 Enacted level. This budget integrates three core components: research, operations, and targeted line-item construction projects to address ongoing disruptions in high-impact isotope supply chains for critical national applications and transformative technologies. These technologies include medical treatments, national security needs, semiconductor and microelectronics manufacturing, quantum computing, advanced fission and fusion reactors, nuclear batteries, and radioisotope power sources.

The research portfolio will prioritize core research activities, emphasizing secure domestic supply chains for isotopes vital to national security and Administration priorities, such as cancer diagnosis and treatment, fusion energy, microelectronics, quantum computing, and biopreparedness. Increased support will be directed towards high-priority research in artificial intelligence and machine learning to improve efficiencies and automation in isotope science and advanced manufacturing. The request also includes increased support for research to advance the production of isotopes for quantum computing. Continued investments in microelectronics aim to strengthen the onshoring of isotope supply chains critical for semiconductor and microelectronics manufacturing and quality control.

Operations for isotope production facilities are supported, ensuring essential scientists and engineers can address gaps in isotope supply, prioritized based on impact to human life, national defense, and the Nation’s economy. Investments will support targeted modernization and refurbishment activities to increase safe and reliable operations across production sites. Support for the University Isotope Network is maintained for medical, research, and "boutique" radioisotopes, which are more cost-effectively produced outside national labs. Support continues for new capabilities introduced in FY 2025. These include the Stable Isotope Production Facility MIE, the Medical Isotope Research Producer Facility (MIRP), the Facility for Rare Isotope Beams (FRIB) Isotope Harvesting, and new electromagnetic ion separators. Staffing is maintained at the National Isotope Development Center (NIDC) to assess market needs and address the increasing interfaces with the stakeholder community. The program will continue efforts to establish a heavy water inventory and address high-risk isotopes, including helium-3, strontium-90, carbon-14, iridium-192, krypton-85 and promethium-147. It also addresses increasing the production of promethium-147 and increasing inventories of heavy curium from the Mark 18-A used nuclear fuel rods for use as target material in the production of californium-252.

The FY 2026 Request maintains funding at $45.9 million in Total Estimated Cost (TEC) to the Stable Isotope Production and Research Center (SIPRC). SIPRC will expand the nation’s capability to enrich stable isotopes for medical, industrial, and research applications, mitigating U.S. dependence on sensitive countries. The Radioisotope Processing Facility (RPF) advances preliminary engineering design efforts after a planned CD-1 approval in FY 2025; RPF will address a lack of available radiochemical processing equipment to mitigate U.S. dependency on sensitive foreign supply chains of radioisotopes and modernize/expand existing capabilities.

Isotope R&D and Production
Funding

(dollars in thousands)

	FY 2024 Enacted	FY 2025 Enacted	FY 2026 Request	FY 2026 Request vs FY 2025 Enacted
Isotope R&D and Production				
Isotopes, Research	40,302	36,365	25,827	-10,538
Isotopes, Operations	59,491	80,371	83,603	+3,232
Subtotal, Isotope R&D and Production	**99,793**	**116,736**	**109,430**	**-7,306**
Construction				
20-SC-51 U.S. Stable Isotope Production and Research Center (SIPRC), ORNL	20,900	45,900	45,900	–
24-SC-92 Clinical Alpha Radionuclide Producer (CARP), BNL	1,000	–	–	–
24-SC-91 Radioisotope Processing Facility, ORNL	8,500	7,000	7,000	–
Subtotal, Construction	**30,400**	**52,900**	**52,900**	**–**
Total, Isotope R&D and Production	**130,193**	**169,636**	**162,330**	**-7,306**

Note:
- *The FY 2024 Enacted IRP total does not include foreign aid supplement funding.*

Basic and Applied R&D Coordination

Effective coordination and integration are crucial to ensure the availability of critical isotopes for federal missions, industrial applications, and academic research. These efforts are essential for various federal agencies, including the National Aeronautics and Space Administration (NASA), the Department of Defense (DoD), the Office of the Director of National Intelligence (ODNI), the National Institute of Standards and Technology (NIST), the Federal Bureau of Investigations (FBI), the Department of Agriculture, the Department of Homeland Security (DHS), and the National Science Foundation (NSF). The IRP conducts a biennial Workshop on Federal Isotope Supply and Demand to anticipate and address evolving needs, gathering five-year projections from all federal agencies.

The IRP maintains coordination and communication through participation in Federal and Interagency Working Groups, OSTP Subcommittees, National Security Council meetings, and White House Small Group and Inter Policy Committees. Additionally, the IRP leads the Interagency Group on He-3 to determine annual federal allocations from reserves. The IRP also collaborates with other DOE Offices on domestic supply chains of valuable isotopes, such as americium-241, He-3, heavy curium, strontium-90, promethium-147, and krypton-85, noting that Russia is often the only other producer of these isotopes.

Description

IRP strategically integrates three core components: research, operations, and targeted line-item construction projects.

Research

Research activities are the bedrock of IRP, driving both fundamental discoveries and applied solutions. Funding supports core research groups at national laboratories and universities, fostering innovation in isotope production and related technologies. This encompasses stable and radioisotopes, competitive research opportunities, SC research initiatives, maintenance of core competencies in staff and equipment at university facilities, individual university research projects, and comprehensive workforce development. Core research focuses on identifying and developing new production pathways and enhancing the efficiency, reliability, and cost-effectiveness of existing processes, ultimately ensuring a stable, affordable, and accessible supply of critical isotopes for diverse applications.

IRP supports core research groups at Argonne National Laboratory (ANL), Brookhaven National Laboratory (BNL), Los Alamos National Laboratory (LANL), Oak Ridge National Laboratory (ORNL), and Pacific Northwest National Laboratory (PNNL) to conduct innovative research for novel or advanced production and chemical separation techniques for critical isotopes. Core research support is also provided to the University Isotope Network (UIN) institutions, which are essential for strengthening domestic supply chains and fostering national research competitiveness while playing a key role in workforce development. The UIN is currently comprised of the University of Washington (UW) Medical Cyclotron Facility, the University of Missouri Research Reactor (MURR), FRIB Isotope Harvesting at Michigan State University (MSU), University of Alabama-Birmingham (UAB), University of Wisconsin-Madison (UWM), and Texas A&M University (TAMU). These universities have unique capabilities: UW and TAMU operate multi-particle cyclotrons, highlighted by the development of full-scale production of the alpha-emitter astatine-211 for cutting-edge cancer therapy, and the UW cyclotron distributes a variety of isotopes and provides crucial target fabrication expertise for the UIN. MURR boasts the highest flux university research reactor in the United States and recognized expertise in current Good Manufacturing Practices (cGMP) protocols, making it invaluable for DOE IP's production and processing of critical isotopes such as lutetium-177 for cancer therapy research, gadolinium-153 for brachytherapy, nuclear medicine imaging, and SPECT myocardial perfusion imaging, and terbium-161 for cancer treatment. The UAB cyclotron features four beamlines and associated target stations to produce a variety of radioisotopes, as well as specialized hot cells for preparation of human-use and preclinical radiopharmaceuticals. At Michigan State University, the innovative FRIB Isotope Harvesting project repurposes unwanted waste from nuclear physics research into valuable research assets.

A key priority for IRP is fostering a strong national core competency in stable isotope enrichment. Enriched stable isotopes are foundational for numerous applications, including the production of all radioisotopes, which are vital in medicine, industry, and research. The production of each enriched stable isotope requires an intense research campaign. The program provides core research funding for stable isotopes to ORNL and supports machine design optimized for production of isotopes of interest for quantum computing as part of the SC QIS Initiative. Similarly, support through the SC initiatives also promotes growth in radioisotope development. Participation in the Microelectronics initiative enables production of isotopes needed for semiconductors and microelectronics manufacturing, particularly for critical defense applications (e.g., krypton-85 for electronics testing, deuterium for performance).

The IRP's competitive research funding supports universities and national laboratories, specifically research to develop novel isotopes of interest to U.S. stakeholders and establish secure domestic isotope supply chains. For example, IRP is working to develop technology to detritiate legacy heavy water at Savannah River National Laboratory (SRNL). Other examples of competitive research topics include the production of isotopes for next-generation advanced fission reactors and fusion reactors, innovative medical isotopes, new sources of helium-3, rare isotopes for nuclear forensics, critical nuclear data measurements, radioisotope enrichment technology, advanced targetry, modular automated systems, robotics, and the application of machine learning and artificial

intelligence to isotope production.

Another high priority research area is the development of transformative medical isotopes for enhanced disease diagnosis and treatment, with the ultimate goal of reducing cancer mortality. There is escalating global interest in alpha and beta emitters for revolutionary cancer and infectious disease therapy and diagnostics. The IRP is often the sole global source for many of these isotopes or leading the way in innovative research and manufacturing to make them available. A key priority is expanding radiochemical processing infrastructure to meet growing U.S. demand for alpha-emitters, including actinium-225 (Ac-225)

IRP supports training and development opportunities for students and post-docs to foster a vibrant workforce for isotope production and to advance workforce capabilities. Support for AI/ML enables growth in areas to facilitate more effective techniques for highly cumbersome isotope production processes, and to promote modern solutions to increase efficiencies and opportunities.

IRP sponsors workshops at professional society meetings to disseminate advances in isotope availability, research & development, and production. It invests in the Nation's future nuclear chemistry and biomedical researchers through support for the Nuclear Chemistry Summer School (NCSS) program. The NCSS, jointly supported with SC's Basic Energy Sciences (BES) and Nuclear Physics (NP) programs, consists of an intensive six-week program of formal accredited lectures on the fundamentals of nuclear science, radiochemistry, and their applications in related fields, supplemented by laboratory practicums focusing on state-of-the-art instrumentation and technology used routinely in basic and applied nuclear science.

Facility Operations

The IRP supports activities at National Laboratories related to reactor, accelerator, and enrichment facilities. This support encompasses expert staff for managing, operating, and maintaining facilities and equipment for isotope production and enrichment. Strategic investments ensure safe, cost-effective, and reliable operations. The program also supports equipment for chemical processing (e.g., hot cells and glove boxes), pre-operations of stable isotope equipment, inventory management and dispensing, advanced manufacturing capabilities, operations support and assembly, and the National Isotope Development Center (NIDC).

The IRP network of facilities produces a diverse range of isotopes:

- Accelerators: The Isotope Production Facility (IPF) at LANL, the Brookhaven Linac Isotope Producer (BLIP) facility at BNL, and the Low Energy Accelerator Facility (LEAF) at ANL are key assets. The IPF and BLIP, both proton accelerators, provide continuous year-round availability of medical radioisotopes. The IPF operates in conjunction with the National Nuclear Security Administration (NNSA) Los Alamos Neutron Science Center (LANSCE), while BLIP operates with the Relativistic Heavy Ion Collider, which will transition to the Electron Ion Collider. BNL also operates the MIRP cyclotron for specialized medical isotopes and isotopes for fundamental research. ANL's LEAF, the program's only electron accelerator, provides unique pathways for producing essential medical radioisotopes.

- Research Reactors: The IRP leverages the capabilities of three research reactors: the High Flux Isotope Reactor (HFIR) at ORNL, the Advanced Test Reactor (ATR) at INL, and the University of Missouri Research Reactor (MURR). These reactors contribute to isotope production, and related chemical processing and handling equipment is supported at each site.

- Chemical Processing: Processing capabilities are supported at PNNL for isotopes like strontium-90, radium-226, krypton-85, and lead-212. At INL, the ATR ensures a reliable domestic supply of cobalt-60. At the Y-12 National Security Complex, the IRP supports the preparation and packaging of lithium isotopes and uranium-235, while americium-241 is recovered from NNSA plutonium processes at LANL. Helium-3 is extracted from NNSA-owned tritium beds at the Savannah River Site, and the radioisotope separator at INL enriches radioisotopes for nuclear forensics.

- Enrichment Technologies: Individual electromagnetic ion separators are assembled and operated at

ORNL. Thermal diffusion enrichment capabilities are operated at PNNL. IRP-supported research demonstrated the feasibility of new Electromagnetic Isotope Separation (EMIS) and gas centrifuge (GC) technologies and re-established a prototype general enriched stable isotope production capability in the U.S. The Stable Isotope Production Facility (SIPF) Major Item of Equipment (MIE) at ORNL established the first full-scale GC cascade to enrich stable isotopes. The implementation of SIPF is beginning transition to routine operations to produce enriched xenon-129 in FY 2026.

The NIDC, located at ORNL, manages IRP business operations, including sales, contract negotiation, marketing assessments, public outreach, quality control, packaging, and transportation. It facilitates regular and frequent interfaces between IRP and industrial, academic, and medical communities to ensure that strategies are evidence-based and informed by stakeholder interactions. In particular, the IRP biennially canvasses the broad federal community for isotope demands to align priorities with evidence-based program evaluations.

The IRP provides over 250 stable isotopes from inventory and produces approximately 80-100 radioisotopes in short supply for the Nation. Some examples of how these isotopes impact America:

- Cancer therapy and imaging diagnostics: actinium-225, actinium-227, astatine-211, cerium-134, scandium-47, scandium-44, holmium-166m, gadolinium-153, tungsten-188, lutetium-177, strontium-89, strontium-90, tin-117m, vanadium-48, manganese-52, manganese-54, gold-199, terbium-161, cobalt-55, and cobalt-60
- Cancer and infectious disease therapy and research: bismuth-213, lead-212, lead-203, astatine-211, copper-67, thorium-227, thorium-228, radium-223, and radium-224
- Pharmaceutical and agrochemical applications: carbon-14
- Feedstock for isotopes that treat prostate cancer: ytterbium-176, radium-226
- Nuclear forensics: neptunium-236
- Explosives detection and nuclear batteries: nickel-63
- Neutron detectors for homeland security applications and fusion research: lithium-6
- Cryogenics and radiation detection: helium-3
- Industrial radiography: iridium-192, selenium-75
- Nuclear reactor start-up, oil and gas exploration and production well logging: californium-252
- Quantum computing research, medical standards, and industrial sources: barium-133
- Microelectronics manufacturing and quality control: krypton-85
- Nuclear batteries and power sources: strontium-90, promethium-147, americium-241, and thulium-170
- Use as targets for discovery of new super heavy elements: berkelium-249, americium-243, uranium-238, plutonium-242, plutonium-244, californium-249, californium-251, einsteinium-254, and curium-248
- Heavy element chemistry research: fermium-257
- Oceanography and climate modeling: silicon-32
- Quantum memory: ytterbium-171

Developing an economically and technically viable commercial market for an isotope can take decades. The IRP remains committed to working closely with industry to commercialize promising technologies and promote the growth of independent domestic producers, ensuring a seamless transition that does not disrupt isotope supply or hinder ongoing research. Once domestic commercial production is established, IRP ceases production to avoid competition with the private sector, as was historically illustrated by strontium-82 for cardiac heart imaging and germanium-68 for medical diagnostics.

Projects

IRP is strategically executing two line-item construction projects to strengthen U.S. isotope supply chains and reduce dependence on sensitive foreign sources. The Stable Isotope Production and Research Center (SIPRC) project will re-establish large-scale stable isotope enrichment in the United States, positioning the nation to compete effectively with Russia and China. The Radioisotope Processing Facility (RPF) will address the critical need for modernized nuclear and radiochemistry capabilities and eliminate U.S. reliance on Russia for high-impact radioisotopes, while simultaneously modernizing and expanding existing capabilities.

Activities and Explanation of Changes

(dollars in thousands)

FY 2025 Enacted	FY 2026 Request	Explanation of Changes FY 2026 Request vs FY 2025 Enacted
Isotope R&D and Production $169,636	**$162,330**	**-$7,306**
Isotopes, Research $36,365	$25,827	-$10,538
Core research supports the highest impact R&D activities at universities and national laboratories to strengthen the Nation's scientific and technical strengths. These activities drive fundamental scientific discovery and applied solutions. Competitive research focuses on establishing robust domestic supply chains to mitigate disruptions caused by geopolitical events. The UIN, comprising six universities, is leveraged to produce unique isotopes and promote workforce development. Research efforts dedicated to isotopes for quantum computing continue, along with participation in SC initiatives (BRaVE and Microelectronics). Funding supports the Nuclear Chemistry Summer School and participation in the SC Early Career Awards Program.	The Request will maintain support for the highest priority R&D activities at national laboratories, focused on urgently establishing domestic supply chains to establish U.S. independence and mitigate disruptions caused by geopolitical events. Competitive research at domestic universities will be prioritized based on alignment with Administration priorities and available funding. The UIN will continue to produce high-priority research, "boutique" radioisotopes, and isotopes to address urgent domestic needs The recently completed FRIB Isotope Harvesting Project will achieve routine operations. Funding will sustain efforts to develop isotopes for quantum computing and to strengthen the domestic supply chain for microelectronics manufacturing, and support advances in AI/ML to enhance the efficiency of isotope production processes. Funding will be applied to ramp up the recovery of heavy curium from the Mark 18-A targets.	Support for AI/ML technologies will drive the development of automated equipment and chemical processing techniques, for more effective isotope production. Support for workforce development from RENEW and FAIR initiatives, as well as support for BRAVE, is being strategically redirected to higher priority R&D efforts in alignment with Administration priorities.

(dollars in thousands)

FY 2025 Enacted	FY 2026 Request	Explanation of Changes FY 2026 Request vs FY 2025 Enacted
Isotopes, Operations $80,371	$83,603	+$3,232
Funding supports facility operations at all production and processing sites enabling the Program to address isotope supply chains gaps and ensure domestic sources for critical isotopes. Funding continues to support the implementation and operations EMIS and the development of other enrichment core competencies. The newly refurbished cyclotron at BNL begins steps for transitions to routine operations. Strategic investments target high priority single point failures at the production sites, as well as deferred maintenance.	The Request will support facility operations at all production facilities and processing sites with an emphasis on addressing gaps in high priority isotope supply chains. Prioritized investments will support targeted modernization and refurbishment activities to enhance operational safety, robustness, and reliability. The Request sustains support for the MIRP Facility, which produces and processes isotopes used for cancer treatments and fundamental research, and new units of EMIS to enrich stable isotopes in short supply as they transition to routine operations. Staffing will be maintained at NIDC to manage growing interfaces with stakeholders.	Increased operations funding will continue to empower isotope production supply chains, stimulate innovation, and ensure a stable supply of these critical materials to fuel breakthroughs in medicine, technology, and scientific research. The increased funding will bolster critical supply chains for isotope production, ensuring growing a stable and reliable supply of urgently needed materials.

Description

The Isotope Research & Development and Production Program (IRP), also known as the DOE Isotope Program (DOE IP), collaborates with federal agencies and industry to ensure American isotope independence and mitigate disruptions in critical isotope supply chains. To support this, IRP invests in new capabilities through construction projects to meet U.S. demand and decrease reliance on geopolitically sensitive countries. These new facilities will enable American self-reliance with innovative R&D, increased processing capability, and expanded production of critical isotopes, including those not available elsewhere. The construction projects represent a significant portion of the overall IRP budget.

IRP strategically executes two line-item construction projects:

24-SC-91, Radioisotope Processing Facility (RPF)

The RPF at ORNL is critical to mitigating radioisotope dependence on geopolitically sensitive countries and meeting U.S. demand for isotopes essential to national defense, space exploration, energy security, and medical applications. To bolster domestic supply chains and enable innovative R&D, it is critical to expand U.S. radioisotope chemical processing and development capacity. The RPF is planned as a Hazard Category 2 nuclear facility outfitted with specialized equipment able to process the higher specific activity targets that are irradiated in a reactor, such as HFIR. Current chemical processing capabilities are aged and at capacity, limiting the ability of the U.S. to onshore isotope supply chains and meet U.S. demand. RPF is designed for flexibility by incorporating modular components scaled to specific production needs, which enables reconfiguration to meet evolving radioisotope needs without costly facility modifications. The project received CD-0, Approve Mission Need, approval on April 29, 2021. The total cost range is now projected at $510,000,000 to $900,000,000, reflecting an enhanced understanding of design parameters and nuclear safety protocols achieved during the conceptual design phase. This, combined with evolving market costs associated with specialized radiochemical equipment, has led to adjustments in both budget and timeline to maintain optimal alignment with mission objectives. The RPF will address a lack of available radiochemical processing equipment to mitigate U.S. dependency on sensitive foreign supply chains of radioisotopes and modernize/expand existing capabilities. As part of the preparations to achieve CD-1, Approve Alternative Selection and Cost Range, planned for FY 2026, the project is assessing the impacts to estimated costs and schedule from available funding, inflation, and supply chain constraints since project initiation.

20-SC-51, U.S. Stable Isotope Production and Research Center (SIPRC)

The Stable Isotope Production and Research Center (SIPRC) will reinstate versatile, large-scale stable isotope enrichment capacity in the United States. Russia is the major producer of most stable isotopes and China is a rapidly emerging leader. Once constructed, SIPRC will provide stable isotopes that are catalysts for American industry, medicine, research, and national security. The current capacity within the U.S. is insufficient to meet the Nation’s growing demands and the current inventory of stable isotopes is being depleted. SIPRC will launch the Nation’s capability to enrich stable isotopes by expanding gas centrifuge and electromagnetic isotope separation (EMIS) capabilities. SIPRC received CD-1, Approve Alternative Selection and Cost Range, and Subproject 1 CD-3A, Approve Long Lead Procurement, approvals on November 4, 2021. The project received approval for Subproject 1 CD-3B, Approve Long Lead Procurement, on July 19, 2023. Subproject 1, Facility and EMIS, received approval for CD-2, Approve Performance Baseline as well as CD-3, Approve Start of Construction, on March 15, 2024. The Total Project Cost (TPC) point estimate is $325,000,000 with a preliminary TPC range of $187,000,000 to $338,000,000, approved at CD-1.

Activities and Explanation of Changes

(dollars in thousands)

FY 2025 Enacted	FY 2026 Request	Explanation of Changes FY 2026 Request vs FY 2025 Enacted
Construction $52,900	**$52,900**	**$ —**
24-SC-91, Radioisotope Processing Facility (RPF) $7,000	$7,000	$ —
Funding supports TEC of the RPF at ORNL. RPF will address a lack of available radiochemical processing infrastructure within the DOE IP complex for reactor target processing which inhibits production of critical isotopes. RPF will mitigate U.S. dependence on foreign radioisotope supply chains.	The Request will support TEC of the RPF at ORNL. RPF will address a lack of available radiochemical processing infrastructure for reactor target processing which inhibits production of critical isotopes. RPF will mitigate U.S. dependence on foreign radioisotope supply chains.	No change in funding.
20-SC-51, U.S. Stable Isotope Production and Research Center (SIPRC) $45,900	$45,900	$ —
Funding continues design and construction of the U.S. SIPRC at ORNL, according to project plans, to provide large scale stable isotope production capacity for the Nation and mitigate U.S. dependence on foreign capabilities.	Funding will continue design and construction of the U.S. SIPRC at ORNL according to project plans, to re-establish large scale stable isotope production capacity for the Nation and mitigate U.S. dependence on foreign capabilities.	No change in funding.

Isotope R&D and Production
Capital Summary

(dollars in thousands)

	Total	Prior Years	FY 2024 Enacted	FY 2025 Enacted	FY 2026 Request	FY 2026 Request vs FY 2025 Enacted
Capital Operating Expenses						
Capital Equipment	N/A	N/A	8,082	8,082	7,002	-1,080
Total, Capital Operating Expenses	**N/A**	**N/A**	**8,082**	**8,082**	**7,002**	**-1,080**

Isotope R&D and Production
Construction Projects Summary

(dollars in thousands)

	Total	Prior Years	FY 2024 Enacted	FY 2025 Enacted	FY 2026 Request	FY 2026 Request vs FY 2025 Enacted
24-SC-91, Radioisotope Processing Facility (RPF), ORNL						
Total Estimated Cost (TEC)	834,000	-	8,500	7,000	7,000	-
Other Project Cost (OPC)	65,406	14,600	-	-	-	-
Total Project Cost (TPC)	**899,406**	**14,600**	**8,500**	**7,000**	**7,000**	**-**
24-SC-92, Clinical Alpha Radionuclide Producer (CARP), BNL						
Total Estimated Cost (TEC)	1,000	-	1,000	-	-	-
Other Project Cost (OPC)	2,085	585	1,500	-	-	-
Total Project Cost (TPC)	**3,085**	**585**	**2,500**	**-**	**-**	**-**
20-SC-51, U.S. Stable Isotope Production and Research Center (SIPRC), ORNL						
Total Estimated Cost (TEC)	289,800	111,000	20,900	45,900	45,900	-
Other Project Cost (OPC)	5,600	3,200	-	-	-	-
Total Project Cost (TPC)	**295,400**	**114,200**	**20,900**	**45,900**	**45,900**	**-**
Total, Construction						
Total Estimated Cost (TEC)	**N/A**	**N/A**	**30,400**	**52,900**	**52,900**	**-**
Other Project Cost (OPC)	**N/A**	**N/A**	**1,500**	**-**	**-**	**-**
Total Project Cost (TPC)	**N/A**	**N/A**	**31,900**	**52,900**	**52,900**	**-**

Notes:

- *The Radioisotope Processing Facility (RPF) point estimate is $640,000,000; the estimated TPC is displayed at the upper TPC range of $899,406,000 because RPF is not yet baselined. The complete estimated TPC (based on upper TPC range) does not include $594,000 in OPC funding included in the Nuclear Physics program for prior years. The complete estimated cost of the TPC (upper range) for RPF, combining the Nuclear Physics and Isotope R&D and Production funding, is $900,000,000. This project is not baselined and the TPC estimates are currently being re-evaluated to consider available funding, supply chain challenges, and inflation since initiation.*
- *The preliminary TPC for the U.S. Stable Isotope Production and Research Center (SIPRC) of $295,400,000 does not include $29,600,000 ($24,000,000 TEC and $5,600,000 OPC) included in the Nuclear Physics program for prior years. The complete preliminary total for SIPRC, combining the Nuclear Physics and Isotope R&D and Production funding, is $325,000,000. For SIPRC, Subproject 1 is baselined; Subproject 2 and Subproject 3 are not yet baselined*
- *The Clinical Alpha Radioisotope Producer (CARP) point estimate is $74,000,000; the preliminary TPC is displayed at the upper TPC range of $80,000,000 because CARP is not yet baselined. The TPC estimates are currently being re-evaluated to consider available funding, supply chain challenges, and inflation since initiation.*

Isotope R&D and Production
Scientific Employment

	FY 2024 Enacted	FY 2025 Enacted	FY 2026 Request	FY 2026 Request vs FY 2025 Enacted
Number of Permanent Ph.Ds (FTEs)	42	55	52	-3
Number of Postdoctoral Associates (FTEs)	29	27	20	-7
Number of Graduate Students (FTEs)	32	26	20	-6
Number of Other Scientific Employment (FTEs)	124	240	231	-9
Total Scientific Employment (FTEs)	**227**	**348**	**323**	**-25**

Note:
- *Other Scientific Employment (FTEs) includes technicians, engineers, computer professionals, and other support staff.*

24-SC-91, Radioisotope Processing Facility (RPF)
Oak Ridge National Laboratory, ORNL
Project is for Design and Construction

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

Summary

The FY 2026 Request for the Radioisotope Processing Facility (RPF) is $7,000,000 of Total Estimated Cost (TEC) funding. The CD-1 preliminary Total Project Cost (TPC) point estimate is planned at $640,000,000 with a TPC range of $510,000,000 to $900,000,000.

Significant Changes

This project data sheet (PDS) is an update of the FY 2025 PDS; this project is not a new start in FY 2026. The most recent DOE Order 413.3B approved CD is CD-0, Approve Mission Need, which was approved on April 29, 2021. The project is working to achieve CD-1/3A, Approve Alternative Selection and Cost Range, planned for FY 2026.

Other Project Cost (OPC) activities related to conceptual design and research and development come to completion in FY 2025. FY 2023 Enacted Appropriation and the Inflation Reduction Act (IRA) fully funded activities that will finalize the conceptual design of the facility, modular hot cell units, and radiochemical equipment in preparation for CD-1. The
FY 2026 Request will provide support for initiating preliminary engineering design for both the facility and the innovative modular hot cell approach once the project attains CD-1 approval. In addition, the design activities will incorporate the need to ensure the production of key radioisotopes as critical legacy nuclear facilities approach their end of life. The cost range, schedule, and technical scope has been, and will continue to be, thoroughly assessed and validated through evidence-based independent peer review in FY 2025 to consider impacts of supply chain constraints and design maturity that have increased the project cost and schedule.

A Federal Project Director (FPD) with certification Level I has been assigned to RPF.

Critical Milestone History

Fiscal Year	CD-0	Conceptual Design Complete	CD-1	CD-2	Final Design Complete	CD-3	CD-4
FY 2026	4/29/21	4Q FY 2025	1Q FY 2026	2Q FY 2030	2Q FY 2030	2Q FY 2030	2Q FY 2038

CD-0 – Approve Mission Need for a construction project with a conceptual scope and cost range; **Conceptual Design Complete** – Actual date the conceptual design was completed (if applicable); **CD-1** – Approve 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 Closeout.

Fiscal Year	Performance Baseline Validation	CD-3A	CD-3B
FY 2026	2Q FY 2030	4Q FY 2027	4Q FY 2028

CD-3A – Approve Long-Lead Procurements (Early Site Preparation)
CD-3B – Approve Long-Lead Procurements (Modular Hot Cell Fabrication)

Project Cost History

This project has a preliminary point estimate of $640,000,000 and a corresponding TPC range of $510,000,000 to $900,000,000; the PDS is written to the upper limit of the TPC range as the project is not baselined. No construction, excluding approved long-lead procurement, will be performed until the project performance baseline has been validated and CD-3 has been approved.

(dollars in thousands)

Fiscal Year	TEC, Design	TEC, Construction	TEC, Total	OPC, Except D&D	OPC, Total	TPC
FY 2025	38,300	536,700	575,000	40,000	40,000	615,000
FY 2026	79,000	755,000	834,000	66,000	66,000	900,000

Notes:
- *This project has not received CD-2 approval; therefore, funding estimates are preliminary.*
- *Since project is at CD-0, the funding estimates correlate to the upper end of the estimated TPC range.*

2. Project Scope and Justification

Scope

The scope of this project includes design and construction of a new Hazard Category 2 radioisotope processing facility, with an approximately 60,000 square feet footprint, and the specialized equipment for chemically processing radioisotopes, with particular focus on irradiated reactor targets. RPF will be a purely technical facility (i.e., minimal office and staff amenities) dedicated to research and operations and located on the Oak Ridge National Laboratory (ORNL) main campus. The design is planned to support up to eight new radioisotope processing bays and be equipped with sufficient hot cells grouped to support new product lines and research and development activities intended to scale production to meet U.S. demand. Facility design concepts will include separate bays needed to support reconfigurable heavy shielding for transloading of irradiated targets and waste handling and storage of radioactive materials. The facility will be designed to incorporate other operations required to successfully produce isotopes such as staging and repair of manipulators and other equipment as well as the supporting infrastructure necessary for efficient operations such as cranes to assist in moving casks within the facility. The facility design will address how current Good Manufacturing Practices (cGMP) compliance will be assured. Construction of the proposed facility will also integrate safety-by-design, quality-by-design, and safeguards-by-design standards to ensure safe and efficient future operations.

Justification

RPF is critical to the Nation and to IRP. Radioisotopes are essential to ensure American isotope independence for key energy, medical, space, environmental, and national security applications and for basic research. Currently, radioisotope chemical processing capacity at appropriate hazard category facilities, and outfitted with specialized equipment such as hot cells, glove boxes and supporting laboratories, is the limiting factor for increasing domestic radioisotope production and establishing U.S. independence from foreign supplies of reactor produced isotopes. The Nation is currently not poised to meet U.S. demand in radioisotopes. RPF is designed for flexibility by incorporating modular components scaled to specific production needs which can be reconfigured to meet evolving radioisotope needs without costly facility modifications. Without additional radiochemical processing capabilities for isotope separations, especially in proximity to the HFIR at Oak Ridge National Lab, the United States will remain dependent on isotope supply chains from geopolitically sensitive countries such as Russia, putting high priority applications critical to American industry, scientific and technical strength, medicine, and national security at risk. RPF will provide radioisotope chemical processing capacity to meet the near-and long-term needs of the nation, therefore promoting U.S. economic growth and resilience, as well as reducing dependence on foreign supply.

The project is being conducted in accordance with the project management requirements in DOE Order

413.3B, *Program and Project Management for the Acquisition of Capital Assets*, and all appropriate project management requirements will be met.

Key Performance Parameters (KPPs)

Preliminary Key Performance Parameters (KPPs) are defined at CD-1 and may change as each subproject continues towards CD-2, Approve Performance Baseline. CD-1 approval is expected later in 2025. At CD-2 approval, the KPPs will be baselined. The Threshold KPPs represent the minimum acceptable performance that the project must achieve. The Objective KPPs represent the desired project performance. Achievement of the Threshold KPPs will be a prerequisite for approval of CD-4, Project Completion.

Performance Measure	Threshold	Objective
Design/construct building	TBD	TBD
Instrumentation design/development	TBD	TBD

3. Financial Schedule

(dollars in thousands)

	Budget Authority (Appropriations)	Obligations	Costs
Total Estimated Cost (TEC)			
Design (TEC)			
FY 2024	8,500	8,500	—
FY 2025	7,000	7,000	—
FY 2026	7,000	7,000	18,000
Outyears	56,500	56,500	61,000
Total, Design (TEC)	**79,000**	**79,000**	**79,000**
Construction (TEC)			
Outyears	755,000	755,000	755,000
Total, Construction (TEC)	**755,000**	**755,000**	**755,000**
Total Estimated Cost (TEC)			
FY 2024	8,500	8,500	—
FY 2025	7,000	7,000	—
FY 2026	7,000	7,000	18,000
Outyears	811,500	811,500	816,000
Total, Total Estimated Cost (TEC)	**834,000**	**834,000**	**834,000**

(dollars in thousands)

	Budget Authority (Appropriations)	Obligations	Costs	IRA Supp. Costs
Other Project Cost (OPC)				
Prior Years	4,594	4,594	3,450	5,419
Prior Years - IRA Supp.	10,600	10,600	–	–

(dollars in thousands)

	Budget Authority (Appropriations)	Obligations	Costs	IRA Supp. Costs
Other Project Cost (OPC)				
FY 2024	–	–	–	2,759
FY 2025	–	–	–	1,200
FY 2026	–	–	1,144	1,222
Outyears	50,806	50,806	50,806	–
Total, Other Project Cost (OPC)	**66,000**	**66,000**	**55,400**	**10,600**

(dollars in thousands)

	Budget Authority (Appropriations)	Obligations	Costs	IRA Supp. Costs
Total Project Cost (TPC)				
Prior Years	4,594	4,594	3,450	5,419
Prior Years - IRA Supp.	10,600	10,600	–	–
FY 2024	8,500	8,500	–	2,759
FY 2025	7,000	7,000	–	1,200
FY 2026	7,000	7,000	19,144	1,222
Outyears	862,306	862,306	866,806	–
Total, TPC	**900,000**	**900,000**	**889,400**	**10,600**

Note:
- *Since project is still at CD-0, the funding estimates in the tables above correlate to the upper end of the estimated TPC range.*

4. Details of Project Cost Estimate

(dollars in thousands)

	Current Total Estimate	Previous Total Estimate	Original Validated Baseline
Total Estimated Cost (TEC)			
Design	59,000	27,000	N/A
Design - Contingency	20,000	11,300	N/A
Total, Design (TEC)	**79,000**	**38,300**	N/A
Construction	500,000	370,000	N/A
Construction - Contingency	255,000	166,700	N/A
Total, Construction (TEC)	**755,000**	**536,700**	N/A
Total, TEC	**834,000**	**575,000**	N/A
Contingency, TEC	*275,000*	*178,000*	*N/A*

(dollars in thousands)

	Current Total Estimate	Previous Total Estimate	Original Validated Baseline
Other Project Cost (OPC)			
Conceptual Design	15,194	12,194	N/A
Start-up	33,000	17,806	N/A
OPC - Contingency	17,806	10,000	N/A
Total, Except D&D (OPC)	**66,000**	**40,000**	N/A
Total, OPC	**66,000**	**40,000**	N/A
Contingency, OPC	*17,806*	*10,000*	*N/A*
Total, TPC	**900,000**	**615,000**	N/A
Total, Contingency (TEC+OPC)	***292,806***	***188,000***	***N/A***

Note:
- *Since project is at CD-0, the funding estimates correlate to the upper end of the estimated TPC range.*

5. Schedule of Appropriations Requests

(dollars in thousands)

Fiscal Year	Type	Prior Years	FY 2024	FY 2025	FY 2026	Outyears	Total
FY 2025	TEC	—	8,500	2,000	—	564,500	575,000
	OPC	15,194	—	—	—	24,806	40,000
	TPC	15,194	8,500	2,000	—	589,306	615,000
FY 2026	TEC	—	8,500	7,000	7,000	811,500	834,000
	OPC	15,194	—	—	—	50,806	66,000
	TPC	15,194	8,500	7,000	7,000	862,306	900,000

6. Related Operations and Maintenance Funding Requirements

Start of Operation or Beneficial Occupancy	2Q FY 2038
Expected Useful Life	—
Expected Future Start of D&D of this capital asset	—

Related Funding Requirements
(dollars in thousands)

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

7. D&D Information

	Square Feet
New area being constructed by this project at ORNL	~60,000
Area of existing facility(ies) being replaced	0
Area of any additional D&D space to meet the "one-for-one" requirement	0

8. Acquisition Approach

The ORNL Management and Operating (M&O) contractor, UT Battelle, will perform the acquisition for this project, overseen by the DOE Oak Ridge National Laboratory Site Office. The M&O contractor will consider various acquisition approaches and project delivery methods prior to achieving CD-1 and will be responsible for awarding and administering all subcontracts related to this project. SC will evaluate the M&O contractor's performance through the annual laboratory performance appraisal process.

SC and the M&O will draw from lessons learned from other SC projects and other similar facilities in planning and executing the project.

20-SC-51, U.S. Stable Isotope Production and Research Center (SIPRC)
Oak Ridge National Laboratory, ORNL
Project is for Design and Construction

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

Summary

The FY 2026 Request for the U.S. Stable Isotope Production and Research Center (SIPRC) is $45,900,000 of Total Estimated Cost (TEC) funding. The current Total Project Cost (TPC) point estimate is $325,000,000 with a preliminary TPC range of $187,000,000 to $338,000,000.

Significant Changes

This project data sheet (PDS) is an update of the FY 2025 PDS; the project is not a new start in FY 2026. The most recent DOE Order 413.3B approved Critical Decisions (CD) for SIPRC is CD-1, "Approve Alternative Selection and Cost Range", approved on November 4, 2021. Additionally, the most recent CD approvals for SIPRC Subproject 1 (SP1) are CD-3B, "Approve Long-Lead Procurements" approved on July 19, 2023; and CD-2/3, "Approve Performance Baseline and Approve Start of Construction" approved on March 15, 2024, which authorized the start of SP1 construction-related activities. The project is working towards the next critical milestone, CD-2/3; SP3 anticipated in 2Q FY 2027 and SP2 in 3Q FY 2027.

The Inflation Reduction Act (IRA) funding received in FY 2022 supported the award of the phased SIPRC facility conventional construction contract at the end of FY 2024 and mitigated schedule risks. The FY 2026 Request continues support for construction activities that include completing funding for the phased conventional construction award as well as the procurement of EMIS equipment based on known designs of technologies developed under previous efforts. Due to a change in market demand for the isotope molybdenum, the technical design of the gas centrifuges in Subproject 2 (SP2) has changed to a flexible cascade design intended to produce Xenon or other similar isotopes. The change is not expected to impact the total project costs or the completion date for SP1, however the schedule of SP2 and Subproject 3 (SP3), which will leverage the updated design, is expected to be extended by approximately one year. A Key Performance Parameter will be modified to reflect the change in isotope for operational demonstration for SP2. The technical approach, cost, and schedule of SP2, as well as an annual evaluation of the progress of the SIPRC project, was assessed through evidence-based peer review in early FY 2025 and will be revalidated prior to SP2 and SP3 CD-2/3.

A Federal Project Director (FPD) with certification Level III and a Deputy Federal Project Director have been assigned to the SIPRC.

Critical Milestone History

	CD-0	Conceptual Design Complete	CD-1	CD-2	Final Design Complete	CD-3	CD-4
SIPRC Project	1/4/19	2/26/21	11/4/21	2Q FY 2026	2Q FY 2026	2Q FY 2026	3Q FY2033
SIPRC SP1 - Facility and EMIS	1/4/19	2/26/21	11/4/21	3/15/24	3/15/24	3/15/24	4Q FY2030
SIPRC SP2 - Gas Centrifuge Cascade	1/4/19	2/26/21	11/4/21	3Q FY 2027	3Q FY 2027	3Q FY 2027	3Q FY 2033
SIPRC SP3 - Test Cascade Infrastructure	1/4/19	2/26/21	11/4/21	2Q FY 2027	2Q FY 2027	2Q FY 2027	4Q FY 2032

Notes:
- *Dates shown in the SIPRC Project row in table above correspond to the latest subproject date (broken out by subproject in rows below).*
- *The estimated schedules shown are preliminary.*

CD-0 – Approve Mission Need for a construction project with a conceptual scope and cost range; **Conceptual Design Complete** – Actual date the conceptual design was completed (if applicable); **CD-1** – Approve 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 Closeout.

	Performance Baseline Validation	CD-3A	CD-3B	CD-3C
SIPRC Project	3Q FY 2027	11/4/21	7/19/23	–
SIPRC SP1 - Facility and EMIS	3/15/24	11/4/21	7/19/23	–
SIPRC SP2 - Gas Centrifuge Cascade	3Q FY 2027	N/A	N/A	2Q FY 2026
SIPRC SP3 - Test Cascade Infrastructure	2Q FY 2027	N/A	N/A	N/A

Note:
- *Dates shown in the SIPRC Project row in table above correspond to the latest subproject date (broken out by subproject below). Dates shown for CD-3C are anticipated.*

CD-3A for Subproject 1 – Approve Long-Lead Procurements (EMIS components and Facility Site Preparation)
CD-3B for Subproject 1 – Approve Long-Lead Procurements (Additional EMIS components)
CD-3C for Subproject 2 – Approve Long-Lead Procurements (Additional GC components)

Project Cost History

The overall SIPRC project is at CD-1, with a preliminary point estimate inclusive of SP1, SP2, and SP3, of $325,000,000 and Total Project Cost (TPC) range of $187,000,000 to $338,000,000. No construction, excluding for approved long-lead procurement, will be performed until the project performance baseline has been validated and CD-3 has been approved. SP1, Facility and EMIS, is at CD-2/3, with a baseline estimate of $231,500,000.

(dollars in thousands)

Fiscal Year	TEC, Design	TEC, Construction	TEC, Total	OPC, Except D&D	OPC, Total	TPC
FY 2025	31,000	282,800	313,800	11,200	11,200	325,000
FY 2026	30,300	283,500	313,800	11,200	11,200	325,000

2. Project Scope and Justification

Scope

The scope of this project includes the design and construction of an approximately 64,000 square feet facility, and the associated instrumentation and equipment needed to re-establish large-scale enriched stable isotope production in the United States. Multiple electromagnetic isotope separator systems (EMIS) and a gas

centrifuge cascade will be designed and installed in the new facility which will also include adequate space for test stands, prototype systems development, and future additional machines. The laboratory considered the optimal number of production systems for each type of technology as part of the alternatives analysis for CD-1. SIPRC will be a technical facility (i.e., minimal office and staff amenities) located on the Oak Ridge National Laboratory (ORNL) main campus. Gas centrifuges and electromagnetic separators are based on existing designs leveraging prior projects and R&D supported by the DOE Isotope Program (DOE IP).

Justification

SIPRC is essential to the Nation and to SC's Office of Isotope R&D and Production. The facility will expand the only broad U.S. stable isotope production capability to enable multiple production campaigns of enriched stable isotopes. SIPRC will use innovative technology to foster American isotope independence, ensure domestic supply chains of critical stable isotopes and nurture domestic core competencies in enrichment technologies using centrifuges, electromagnetic ion separators and other enrichment technologies. SIPRC will produce stable isotopes that are catalysts for American industry and are essential for health, research, semiconductor, and national security applications. SIPRC mitigates U.S. dependencies on sensitive foreign countries, a critical need magnified by geopolitical instability. The current capacity within the U.S. is insufficient to meet the Nation's growing demands and the stable isotope inventory is being depleted. The SIPRC project will provide a modern facility and transformative technology to address our Nation's stable isotope needs in an operationally efficient manner.

The project is being conducted in accordance with the project management requirements in DOE Order 413.3B, *Program and Project Management for the Acquisition of Capital Assets*, and all appropriate project management requirements will be met.

Key Performance Parameters (KPPs)

Preliminary Key Performance Parameters (KPPs) are defined at CD-1 and may change as each subproject continues towards CD-2, "Approve Performance Baseline". CD-1 approval was received November 4, 2021. SP1 KPPs are baselined; at SP2 and SP3 CD-2 approval, those KPPs will be baselined. The Threshold KPPs represent the minimum acceptable performance that the project must achieve. The Objective KPPs represent the desired project performance. Achievement of the Threshold KPPs will be a prerequisite for approval of CD-4, Project Completion.

Summary of preliminary KPPs is indicated below.

Performance Measure	Threshold	Objective
Design/construct building	SP1 – Facility and EMIS: Beneficial occupancy of the facility obtained.	SP1 – Facility and EMIS: Beneficial occupancy of the facility obtained.
Instrumentation design/development	SP1 – Facility and EMIS: Ninety percent (90 percent) of the EMIS machines complete a functional operability demonstration of individual EMIS machines running with gas for 4 hours.	SP1 – Facility and EMIS: One hundred percent (100 percent) of the EMIS machines complete a functional operability demonstration of individual EMIS machines running with gas for 4 hours.

Performance Measure	Threshold	Objective
	SP2 – Gas Centrifuge Cascade: a. The SIPRC project will complete the validation and verification (V&V) of the controls system with the completed documentation of the process. b. The SIPRC project will complete documented system leak tests with results meeting the requirements laid out in the systems requirements documents. c. The SIPRC project will complete a mechanical operability test of the completed production GCIS cascade.	SP2 – Gas Centrifuge Cascade: The SIPRC project will complete a Xenon gas test of the constructed cascade. Evidence of completion will be the report on the results of the gas test.
	SP3 – Test Cascade Infrastructure: a. The SIPRC project will complete the V&V of the controls system with the completed documentation of the process. b. The SIPRC project will complete documented system leak tests with results meeting the requirements laid out in the systems requirements documents.	SP3 – Test Cascade Infrastructure: The SIPRC project will successfully complete an operability test of the TCI's feed and withdrawal system using a defined gas. The system must be able to flow gas at the planned flow rate range per the systems requirements document and withdraw the gas from the system piping into cold traps. Evidence of completion will be a report on the results of this test.

3. Financial Schedule

(dollars in thousands)

	Budget Authority (Appropriations)	Obligations	Costs
Total Estimated Cost (TEC)			
Design (TEC)			
Prior Years	27,000	27,000	11,706
FY 2024	—	—	2,955
FY 2025	3,300	3,300	7,000
FY 2026	—	—	4,000
Outyears	—	—	4,639
Total, Design (TEC)	**30,300**	**30,300**	**30,300**
Construction (TEC)			
Prior Years	33,000	33,000	9,977
Prior Years - IRA Supp.	75,000	75,000	—
FY 2024	20,900	20,900	11,946

(dollars in thousands)

	Budget Authority (Appropriations)	Obligations	Costs
Total Estimated Cost (TEC)			
FY 2025	42,600	42,600	90,000
FY 2026	45,900	45,900	70,000
Outyears	66,100	66,100	101,577
Total, Construction (TEC)	**283,500**	**283,500**	**283,500**
Total Estimated Cost (TEC)			
Prior Years	60,000	60,000	21,683
Prior Years - IRA Supp.	75,000	75,000	—
FY 2024	20,900	20,900	14,901
FY 2025	45,900	45,900	97,000
FY 2026	45,900	45,900	74,000
Outyears	66,100	66,100	106,216
Total, Total Estimated Cost (TEC)	**313,800**	**313,800**	**313,800**

(dollars in thousands)

	Budget Authority (Appropriations)	Obligations	Costs
Other Project Cost (OPC)			
Prior Years	8,800	8,800	4,900
FY 2024	–	–	2,535
Outyears	2,400	2,400	3,765
Total, Other Project Cost (OPC)	**11,200**	**11,200**	**11,200**

(dollars in thousands)

	Budget Authority (Appropriations)	Obligations	Costs
Total Project Cost (TPC)			
Prior Years	68,800	68,800	26,583
Prior Years - IRA Supp.	75,000	75,000	–
FY 2024	20,900	20,900	17,436
FY 2025	45,900	45,900	97,000
FY 2026	45,900	45,900	74,000
Outyears	68,500	68,500	109,981
Total, TPC	**325,000**	**325,000**	**325,000**

4. Details of Project Cost Estimate

(dollars in thousands)

	Current Total Estimate	Previous Total Estimate	Original Validated Baseline
Total Estimated Cost (TEC)			
Design	26,800	25,000	N/A
Design - Contingency	3,500	6,000	N/A
Total, Design (TEC)	**30,300**	**31,000**	N/A
Construction	217,300	232,000	N/A
Construction - Contingency	66,200	50,800	N/A
Total, Construction (TEC)	**283,500**	**282,800**	N/A
Total, TEC	**313,800**	**313,800**	N/A
Contingency, TEC	*69,700*	*56,800*	*N/A*
Other Project Cost (OPC)			
Conceptual Design	8,800	8,800	N/A
Start-up	1,700	1,500	N/A
OPC - Contingency	700	900	N/A
Total, Except D&D (OPC)	**11,200**	**11,200**	N/A
Total, OPC	**11,200**	**11,200**	N/A
Contingency, OPC	*700*	*900*	*N/A*
Total, TPC	**325,000**	**325,000**	N/A
Total, Contingency (TEC+OPC)	***70,400***	***57,700***	***N/A***

5. Schedule of Appropriations Requests[a]

(dollars in thousands)

Fiscal Year	Type	Prior Years	FY 2024	FY 2025	FY 2026	Outyears	Total
FY 2025	TEC	135,000	20,900	45,900	—	112,000	313,800
	OPC	8,800	—	—	—	2,400	11,200
	TPC	143,800	20,900	45,900	—	114,400	325,000
FY 2026	TEC	135,000	20,900	45,900	45,900	66,100	313,800
	OPC	8,800	—	—	—	2,400	11,200
	TPC	143,800	20,900	45,900	45,900	68,500	325,000

[a] The project does not have CD-2 approval; FY 2025 schedules and costs are estimates consistent with the updated preliminary point estimate.

6. Related Operations and Maintenance Funding Requirements

Start of Operation or Beneficial Occupancy	3Q FY2033
Expected Useful Life	30 years
Expected Future Start of D&D of this capital asset	3Q FY2063

Note:
- *Start of Operations reflects the initiation of phased implementation of operations for the EMIS units.*

Related Funding Requirements
(dollars in thousands)

	Annual Costs		Life Cycle Costs	
	Previous Total Estimate	Current Total Estimate	Previous Total Estimate	Current Total Estimate
Operations	33,295	33,295	1,106,807	1,106,807
Utilities	4,053	4,053	133,735	133,735
Maintenance and Repair	2,992	2,992	90,458	90,458
Total, Operations and Maintenance	40,340	40,340	1,331,000	1,331,000

Note:
- *Life Cycle Costs includes escalation.*

7. D&D Information

	Square Feet
New area being constructed by this project at ORNL	64,000
Area of existing facility(ies) being replaced	0
Area of any additional D&D space to meet the "one-for-one" requirement	0

The new area being constructed in this project is not replacing existing facilities. Any existing space that is freed up from consolidating activities into SIPRC will likely be repurposed.

8. Acquisition Approach

The ORNL Management and Operating (M&O) contractor, UT Battelle, will perform the acquisition for this project, overseen by the DOE Oak Ridge National Laboratory Site Office. The M&O contractor will be responsible for awarding and administering all subcontracts related to this project. SC will evaluate the M&O contractor's performance through the annual laboratory performance appraisal process.

SC and the M&O will draw from lessons learned from other SC projects and other similar facilities in planning and executing the project.

Isotope Production and Distribution Program Fund

Overview

The Department of Energy's (DOE) Isotope Production and Distribution Program Fund provides a revolving account for the DOE Isotope Program (DOE IP) to facilitate the beneficial production of critical isotopes to strengthen the Nation and cultivate robust domestic supply chains to support federal missions, enable emerging technology, and advance the Nation's economic prosperity and technical competitiveness. The DOE Isotope Program is funded through two primary sources: appropriations allocated to the Office of Isotope R&D and Production (IRP) and revenue generated from isotope sales via a revolving account. When both of these funding sources are considered in conjunction, they constitute the DOE Isotope Program. The DOE IP produces and sells radioactive and stable isotopes, byproducts, surplus materials, and related isotope services to federal agencies, universities, industry, and foreign entities. A key objective of the DOE IP is to enhance the Nation's self-reliance in isotope supply chains, especially those from geopolitically sensitive countries.

Supporting DOE IP, the National Isotope Development Center (NIDC) serves the core function of managing contractual obligations with customers, marketing, and isotope production coordination.The Department supplies isotopes and related services to the Nation under the authority of the Atomic Energy Act of 1954, which specifies the role of the U.S. Government in isotope distribution. The Isotope Production and Distribution Program Fund was established by the 1990 Energy and Water Development Appropriations Act (Public Law 101-101) and amended by the 1995 Energy and Water Development Appropriations Act (Public Law 103-316). Funding for this revolving fund is enabled by annual appropriations from the Science appropriation account, through IRP program, and collections from isotope sales; both are essential to maintain the availability of critical isotopes. Isotopes sold to commercial customers are priced to recognize the full value of production or the market price, whichever is higher. Research isotopes are sold at a reduced price to ensure that the high priority research remains accessible, and that IRP can support the development of new industrial discoveries that benefit the United States. The revolving fund allows continuous and smooth operations of isotope production, sales, and distribution independent of the federal budget cycle and fluctuating sales revenue. It also enables the DOE IP to operate adeptly during times of national importance.

Annual appropriations in the DOE IP program facilitate payments into the revolving fund to sustain effective facility operations, including the support of accomplished scientists and engineers needed to produce and process isotopes, and the maintenance and enhancement of isotope facilities and capabilities to ensure reliable production and provide novel isotopes in high demand. In addition, appropriated funds provide support for R&D activities associated with the development of new production and processing techniques for isotopes and workforce development in isotope production and chemical processing. Appropriated funding also supports construction funds for ongoing line-item projects. Customer revenues offset the costs of producing, dispensing, packaging, and shipping isotopes. About 90 percent of the total resources in the revolving fund are used for operations, maintenance, isotope production, and R&D for new isotope production techniques, with approximately 10 percent available for process improvements, unanticipated changes in revenue, manufacturing equipment, capability and infrastructure upgrades, and capital equipment such as assay equipment, glove boxes, and shipping containers needed to ensure on-time deliveries.

In FY 2025, an estimated total of $237.6 million will be deposited into the revolving fund from the funds appropriated to the IRP budget and from NIDC-collected revenues. This consists of the FY 2025 Enacted level of $169.6 million, plus anticipated collections by NIDC of $68 million to recover costs related to isotope production and isotope services. In FY 2025, the DOE IP expects to sell over 135 different radioactive and stable isotopes to a broad range of research and commercial customers, including major pharmaceutical companies, industrial stakeholders, and researchers at hospitals, national laboratories, other federal agencies, universities, and private companies.

Highlights of the FY 2026 Request

In FY 2026, the Department anticipates continued robust growth in isotope demand, including alpha and beta emitters for novel cancer therapy and medical diagnostics; stable isotopes to enable high-discovery science, emerging technologies in medicine and national security; isotopes for quantum information science; and isotopes for fusion energy; nuclear batteries, semiconductor manufacturing, and power supplies. The Program continues to focus on strengthening U.S. independence from Russian isotope supply chains and enabling the DOE IP to be proactive and target high-risk supply chains effectively to ensure that the U.S. has access to isotopes for discovery science, essential industrial applications, Administration priorities, and to combat cancer.

The IRP's FY 2026 Request is $162.3 million, a decrease of $7.3 million below the FY 2025 Enacted level. In FY 2026, we also anticipate additional collections by NIDC to recover costs related to isotope production and isotope services. Revolving fund resources will be used to strategically address the following priorities in the program:

- Cultivate world-leading core competencies for isotope production to address gaps in supply chains and the provision of innovative, rare isotopes for high priority applications.
- Support facilities with a high degree of effective operations so that they can operate safely, reliably, and efficiently to respond to a crisis and fill gaps in isotope supply chains.
- Introduce novel and critical isotopes to the Nation through cutting-edge research and advanced manufacturing to facilitate emerging technology and applications (medicine, quantum computing, nuclear batteries), promoting U.S. economic prosperity and technical strengths.
- Enhance U.S. self-reliance in foreign supply chains and promote domestic production capabilities with technology transfer.
- Advance and expand transformative, domestic stable isotope enrichment capabilities.
- Improve isotope processing capabilities to address a lack of radiochemical processing capacity limiting the availability of new isotopes, mitigating single point failures to increase the Nation's preparedness for reacting to global supply chain disruptions.
- Address targeted, high priority critical equipment needs to increase operational reliability of facilities by addressing single point failures, increasing spare components, and replacing obsolete equipment.