

2024 YEAR IN REVIEW

MAKING OUR VISION A REALITY



NUCLEAR
STOCKPILE

GLOBAL
SECURITY &
STABILITY

NUCLEAR
NAVAL
PROPULSION

EMERGING
CHALLENGES

WORLD-CLASS
SCIENCE,
TECHNOLOGY &
ENGINEERING

ADAPTIVE
WORKFORCE &
RESILIENT
INFRASTRUCTURE

INTEGRATED
ENTERPRISE
MANAGEMENT &
OPERATIONS

NNSA
National Nuclear Security Administration



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Nuclear Stockpile

WEAPON DELIVERY

NNSA made 100 percent of planned deliveries to the Department of Defense related to the B61-12 Life Extension Program (LEP) and W88 Alteration (Alt) 370 Program. Pantex also exceeded baseline weapon program deliveries for the year. The B61-12 Last Production Unit is scheduled for completion in December 2024. **A**

PLUTONIUM PIT PRODUCTION

The Nuclear Security Enterprise (NSE) made the First Production Unit (FPU) diamond-stamped plutonium pit for the W87-1 Modification Program. The diamond stamp signifies the pit is qualified for deployment to the nuclear stockpile. This demonstrates the ability to make a qualified pit in PF-4 at Los Alamos National Laboratory (LANL), with parts provided from Kansas City National Security Campus (KCNSC) and in cooperation with Lawrence Livermore National Laboratory (LLNL) as the design agency. The NSE is on track to achieve production capacity of at least 30 pits per year at LANL by 2028, and production capacity of at least 50 additional pits per year at the Savannah River Site (SRS) by the mid-2030s. Additionally, NNSA has completed war reserve reacceptance of the pit for W80-4 LEP. A new position at NNSA was created and staffed to integrate across all program and project activities associated with pit production. **B**



Nuclear Stockpile

FUSION IGNITION

The National Ignition Facility (NIF) at LLNL reached a new record fusion yield, generating 5.2 megajoules of fusion energy in one of two ignition shots in 2024. This yield was substantially higher than the previous record of 3.15 megajoules and provided an unprecedented opportunity for NNSA scientists to explore the physics central to the stockpile stewardship mission. **C**

SUBCRITICAL EXPERIMENT

NNSA successfully executed the Twin Peaks subcritical experiment in the Principal Underground Laboratory for Subcritical Experimentation (PULSE) facility at the Nevada National Security Site. It was the first in the Nimble series, executed in partnership with LLNL. This is the first subcritical experiment conducted by the U.S. since late 2021. **D**

WORLD'S FASTEST SUPERCOMPUTER

LLNL commissioned a new exascale computer, El Capitan, clocking in at 1.742 exaFLOPs – which means it can perform 1.742 quintillion calculations per second. This state-of-the-art machine, designed in collaboration between LLNL, Hewlett Packard Enterprise, and AMD, marks a monumental leap forward in high-performance computing, enabling unprecedented modeling and simulation capability essential for NNSA's Stockpile Stewardship Program. **E**



Nuclear Stockpile

DIGITAL ENGINEERING

NNSA's Digital Transformation Senior Steering Group continues to facilitate enterprise-wide collaboration to implement the Digital Transformation initiative and support future weapons programs, beginning with the W93 program. Digital Transformation will enable accelerated product development, integration, qualification, manufacturing and surveillance.

INTEGRATED SURETY ARCHITECTURE

NNSA delivered the first W88 Alt 940 shipment to the Navy in July. This Alt provides an Integrated Surety Architecture that increases security during NNSA transport. **F**

B61-13 TEST AND EVALUATION

The Y-12 National Security Complex (Y-12) completed assembly of the first B61-13 test and evaluation units, keeping the program on track to meet production milestones in 2025. The B61-13 was announced in October 2023 as a higher yield version of the B61-12 to provide the President with additional options against certain harder and large-area military targets.

W80-4 LIFE EXTENSION PROGRAM

NNSA completed six additional war reserve component FPU's for the W80-4 LEP in 2024, bringing the program total to 10, and keeping the program on track to deliver FPU in FY 2027. Additionally, assembly of the canned subassembly was completed at Y-12, on track for component production milestones in 2025.



Nuclear Stockpile

W87-1, SLCM-N, AND W-93 PROGRAMS

The W87-1 Modification Program completed all component conceptual design reviews and is continuing with Phase 6.3, *Development Engineering*. The nuclear-armed sea-launched cruise missile (SLCM-N) officially became a weapon acquisition program in 2024; NNSA created a SLCM-N federal program office and initiated joint development of the system with the Navy. The W93 warhead acquisition program completed the latest System Reference Design and is executing Phase 2, *Feasibility Study and Design Options*. Carrying out the W93 program is vital for continuing the United States' longstanding cooperation with the United Kingdom, which is also modernizing its nuclear forces.

TRITIUM SUPPLY

SRS supplied 100 percent of scheduled tritium-filled reservoirs on time and with zero defects. The site successfully performed five extractions, received a record-high 11 Tritium Producing Burnable Absorber Rod casks, and completed advanced planning and procurement for next year's outage for the replacement of significant infrastructure. 



Nuclear Stockpile

RADIATION CASE PRODUCTION

NNSA successfully restarted production equipment to make fresh alloy for manufacturing radiation cases for nuclear weapons, reestablishing a critical manufacturing capability that was shut down for decades. Additionally, NNSA is exploring new technologies to update and improve the manufacturing approach for radiation cases.

SECURE TRANSPORTATION MISSION DELIVERIES

The Office of Secure Transportation completed nearly 250 missions involving safe and secure deliveries and the movement of equipment in support of training and mission related events without an accident or incident. **H**

U.S.-UK MUTUAL DEFENSE AGREEMENT RENEWAL

NNSA provided critical support to interagency negotiations on the renewal of the Mutual Defense Agreement (MDA), culminating in the approval of the amendment in July 2024 and entry into force in November 2024. The United States and United Kingdom collaborate on nuclear security issues under the MDA, allowing the exchange of nuclear and other materials, equipment, and information for defense purposes. **I**



Nuclear Stockpile

HIGH EXPLOSIVES BINDER CONTRACT

NNSA awarded a contract for FK-800 Binding Material for High Explosives. The contract ensures NNSA acquires enough FK-800 Resin to meet critical nuclear weapons needs. This contract provides NNSA the time needed to develop new binders for future insensitive high explosives.

TRANSPARENCY INITIATIVES

NNSA organized a visit of international diplomats to Sandia National Laboratories and the Nevada National Security Site to demonstrate transparency about its work and U.S. support for the Comprehensive Nuclear Test-Ban Treaty (CTBT). Seven countries and the Preparatory Commission for the CTBT Organization participated.

NNSA also played a key role in the declassification and publication of updated U.S. nuclear stockpile numbers. NNSA led interagency efforts to share this data with the public, strengthening our commitment to transparency. 



Global Security & Stability

HIGHLY ENRICHED URANIUM MINIMIZATION

NNSA continues to reduce the risk of weapons usable materials falling into the wrong hands by replacing highly enriched uranium (HEU) with high-assay low enriched uranium (HALEU) whenever possible. In 2024, NNSA partnered with Japan to convert the first of two cores at Kyoto University Critical Assembly's from HEU to HALEU fuel following a decade-long effort. It marks the 110th reactor or medical isotope facility NNSA helped convert or shut down.

NNSA also signed joint statements with Canada, Italy, and Norway on HEU and plutonium minimization during the 2024 International Conference on Nuclear Security. Administrator Hruby co-chaired an HEU minimization side event with Norway at the 2024 International Atomic Energy Agency (IAEA) General Conference. **K**

SAFEGUARDS TRAINING

August marked the successful launch of an IAEA Centre of Excellence for Safeguards and Non-Proliferation at a Urenco facility in the UK with NNSA support. Referred to as Project Carousel, this will be a nuclear nonproliferation testing and training facility to enhance IAEA safeguards. **L**



Global Security & Stability

SURPLUS PLUTONIUM DISPOSITION (SPD)

NNSA completed more than 55 shipments of downblended surplus plutonium to the Waste Isolation Pilot Plant. Construction and installation of gloveboxes and infrastructure at SRS is moving forward. In addition, the SPD Project received approval to start construction. These efforts demonstrate NNSA's commitment to the state of South Carolina and U.S. nonproliferation objectives. 

NEXT-GENERATION NUCLEAR DETONATION DETECTION

NNSA delivered two next-generation Global Burst Detector IIIF payloads to the U.S. Space Force for integration onto GPS satellites. These payloads will be part of the U.S. system for monitoring the atmosphere for nuclear explosions.

UKRAINE SUPPORT

In response to Russia's continuing invasion of Ukraine, NNSA provided critical assistance to enable the safe, secure, and reliable operation of Ukraine's nuclear power plants, as well as protect other nuclear, radiological, and energy assets in Ukraine. Ongoing support includes 24/7 monitoring of the radiological and nuclear conditions in Ukraine; the provision of medical training and equipment to ensure readiness for response to the worst-case scenarios; and in-kind support and training across the functional areas of physical protection, cybersecurity, and insider threat mitigation.



M



Global Security & Stability

NUCLEAR EMERGENCY SUPPORT TEAM

The Nuclear Emergency Support Team (NEST), which encompasses all Department of Energy (DOE) and NNSA radiological and nuclear emergency response functions, executed 70 operations this year. As an example of its impact, over a four-month operation, the Radiological Assistance Program assisted the Air Force Research Laboratory (AFRL) in returning an Albuquerque-based cobalt-60 irradiator to a safe and secure state. The effort saved AFRL an estimated \$35 million in potential costs.

NEST also celebrated its 50th anniversary with a well-attended event and display, highlighting past and present accomplishments. **N**

INTERAGENCY AND INTERNATIONAL COOPERATION AND EXERCISE

NNSA's Office of Counterterrorism and Counterproliferation conducted more than 50 domestic and international capacity building activities in 2024. These activities aimed to strengthen the nuclear and radiological emergency preparedness and response posture of over 15 international partners, including NATO, Ukraine, Australia, the Republic of Korea, and Japan. For the first time in a decade, NNSA completed a U.S.-UK full-mission profile nuclear weapon accident response exercise demonstrating full personnel and equipment interoperability with international partners during a crisis scenario.

NNSA conducted 14 nuclear forensics operational exercises and training events, demonstrating the capability to respond to nuclear incidents. These events advance nuclear forensics for attribution, supporting U.S. deterrence.



Global Security & Stability

GLOBAL NUCLEAR SECURITY CITIZENSHIP

NNSA hosted the International Physical Protection Advisory Service mission at Sandia National Laboratories to review U.S. nuclear security practices, demonstrate its commitment to international transparency in the protection of nuclear and radioactive materials, model good global nuclear security citizenship, and exhibit confidence in the IAEA's central role in nuclear security.

NNSA and the Belgian Federal Agency on Nuclear Control hosted the Second International Symposium on Insider Threat Mitigation in Brussels showcasing how practitioners, industry, and regulators are advancing insider threat mitigation at nuclear and radiological facilities. Over 200 people from 65 countries participated. 

HIGH-ACTIVITY RADIOACTIVE MATERIAL REMOVAL

NNSA eliminated more than 75 devices containing high-activity radioactive materials in the United States and across the globe. This permanently reduces risk by preventing those materials from being used in acts of terror. 



Global Security & Stability

NUCLEAR POWER REACTOR SAFEGUARDS AND SECURITY

NNSA reached separate bilateral agreements with partners in Japan and the Republic of Korea to cooperate under the Proliferation Resistance Optimization program.

NNSA expanded partnerships with U.S. advanced nuclear developers to integrate international nuclear safeguards and security considerations into their designs. NNSA engaged with 25 industry partners via workshops and trainings.

At the IAEA International Conference on Nuclear Security, NNSA hosted an event highlighting U.S. support for nuclear security capacity building for future nuclear power programs. The event showcased U.S. resources available to support the responsible global expansion of nuclear power with an emphasis on safety, security, and safeguards.

NNSA also joined an \$800 million DOE funding opportunity announcement to offer safeguards and security by design support to the U.S. reactor industry. For the first time, NNSA will competitively award direct funding to incentivize approaches and help provide an edge in exports. 



Naval Nuclear Propulsion

NAVAL REACTORS AT 75

The Naval Nuclear Propulsion Program celebrated its 75th anniversary. Since the first nuclear-powered submarine went to sea in 1955, the U.S. nuclear navy has steamed over 177 million miles, amassed over 7,600 reactor-years of operating experience, and are welcome in over 150 ports globally. **R**

AUKUS

The U.S., UK, and Australian governments concluded negotiations on a trilateral Atomic Energy Act agreement. Twelve Royal Australian Navy personnel, including the first seven enlisted sailors, graduated from Nuclear Power School in October. The Navy also conducted the first modernization of a U.S. submarine in Australian waters when USS Hawaii underwent three weeks of maintenance in Perth. **S**

NUCLEAR TRAINING

The S8G Prototype at Kesselring Site completed its refueling overhaul in July. Recapitalization of the S8G Plant provides another 20 years of prototype training and research and development. Training of nuclear operators recommences at the site in early 2025.

SPENT FUEL HANDLING CONSTRUCTION

The Spent Fuel Handling Recapitalization Project at the Naval Reactors Facility, located at the Idaho National Laboratory, completed the heavily reinforced concrete foundations, continued erecting the structural steel for the main process building, and began constructing spent fuel pools.



Emerging Challenges

COUNTERING UNCREWED AIR SYSTEMS ON NNSA PROPERTY

NNSA advanced counter-uncrewed aircraft system (CUAS) capabilities to address the use of unauthorized UASs over NNSA's facilities. The NexGen CUAS Capabilities Requirements Document was released, and evaluation of vendor submissions are underway. NNSA plans to begin NexGen testing and evaluation at Idaho National Laboratory in FY 2025. **T**

AI THREAT EVALUATION

NNSA developed a capability to evaluate radiological and nuclear risks associated with the emergence of large-scale generative AI frontier models. This combines NNSA's technical nuclear weapons expertise, public private partnerships, and data science capabilities from our national laboratories, which are developing trustworthy AI-based solutions to accelerate progress.

CLEANUP TO CLEAN ENERGY

Under the Department's Cleanup to Clean Energy initiative, land was made available for carbon-free, clean energy projects. NNSA selected a solar energy provider to develop a commercial solar energy project at the Nevada National Security Site. **U**

**T****U**

Emerging Challenges

CARBON-FREE ELECTRICITY

A partnership with Los Alamos County will provide LANL and Sandia National Laboratories with electricity produced from the county's new Foxtail Flats solar and energy storage project, which is expected to begin operating in 2026. It is the largest carbon-pollution-free electricity procurement NNSA has ever made. **V**

HYPERSONIC TECHNOLOGY DEVELOPMENT

Sandia National Laboratories successfully launched a conventional, boost-glide hypersonic weapon that included the first Sandia-designed, industry-produced, glide body. **W**

ENTERPRISE RESILIENCE

NNSA advanced enterprise-wide analyses that bolster resilience to emerging challenges impacting the nuclear security mission. These include studies on issues ranging from supply chain robustness to plutonium integration, which leverage experts across NNSA's labs, plants, and sites, and other expertise, to support building a resilient and responsive complex.



World-Class Science, Technology & Engineering

VENADO SUPERCOMPUTER

The installation of the Venado supercomputer at LANL adds cutting-edge support for national security and basic research. It will accelerate integration of artificial intelligence, bringing new levels of performance to NNSA challenges. **X**

HIGH EXPLOSIVE INNOVATION

Pantex successfully 3D-printed its first additively-manufactured high explosive part. Once mature, the transition of this innovation to full-scale production will provide NNSA with an indigenous capability to deploy high explosives in a manner that is flexible and responsive to the needs of the stockpile while mitigating supply-chain and single-point failure risks.

CANCER TREATMENT

LLNL and BridgeBio Oncology Therapeutics used high-performance computing and artificial intelligence to develop a new drug to fight cancer. This is a significant achievement for cancer drug development and NNSA's Technology Transfer program. **Y**

SCIENCE COLLABORATION

NNSA, the Republic of Korea's Ministry of Science and ICT, and the Cabinet Office of Japan signed a memorandum of cooperation to conduct joint research and development on critical and emerging technology areas. **Z**



Adaptive Workforce & Resilient Infrastructure

ENTERPRISE BLUEPRINT

In October, NNSA released the Enterprise Blueprint, a 25-year plan that aligns the delivery of specialized infrastructure with demands across the nuclear stockpile, global security, and naval nuclear propulsion missions. It prioritizes capabilities for mission delivery and takes a practical approach to prioritizing infrastructure for mission delivery while moving toward a balanced, responsive, and resilient enterprise. 



Adaptive Workforce & Resilient Infrastructure

PIT PRODUCTION INFRASTRUCTURE

NNSA made significant progress on infrastructure projects at LANL and SRS to support plutonium pit production. Demolition and removal work at the Savannah River Plutonium Processing Facility was completed in 2024, with 2,535 gross tons of material sent off-site for recycling. The completion of a design scope in low-risk areas accelerated the start of construction. Pit Production Operations and Programs at SRS achieved a significant milestone by establishing the Machining Training Center, a key facility to teach critical skills and develop competency in various machining tool operations for training. **b**

At LANL, 80,000 square feet of warehouses were completed to provide controlled storage and areas for equipment, mockup, and practice for radiological work, assembly and cold-testing of gloveboxes and other critical equipment prior to installation at the plutonium facility.

PROGRESS ON URANIUM PROCESSING FACILITY

UPF's Process Support Facility achieved energization, allowing for equipment and instrument testing. Electrical commodities for main casting knockout line were completed, paving the way for casting startup in 2026. Installation of 140,000 linear feet of conduit at the Salvage and Accountability Building was completed. Overall, UPF is over 60 percent complete. **c**



b



c

Adaptive Workforce & Resilient Infrastructure

FLEXIBLE MANUFACTURING AND TESTING ENVIRONMENT

The High Bay Laboratory project at Sandia National Laboratories' campus in Livermore, California became fully operational. This modern facility supports advanced testing, manufacturing, and system integration of weapon components, and provides an open, flexible, and secure environment for manufacturing and testing. ^d

ADVANCED FABRICATION FOR HIGH EXPLOSIVES

The Advanced Fabrication Facility at Pantex was completed in September. It houses some of the most technically advanced subtractive and additive manufacturing machines available, enabling new high explosives machining and manufacturing capabilities. ^e

NON-NUCLEAR PRODUCTION INFRASTRUCTURE

Phase I of the KCNSC expansion broke ground in August. The project is expected to have an annual economic impact of \$187 million for Missouri businesses and create about 1,250 jobs during each year of construction. ^f



Adaptive Workforce & Resilient Infrastructure

NNSA WORKFORCE

NNSA produced a Strategic Workforce Plan based on workload drivers to identify federal workforce needs through FY 2031. This serves as the basis of NNSA's staffing plan.

NNSA hired 292 new federal employees in FY 2024, a 37 percent increase in hiring from FY 2023. This new workforce allows NNSA to respond to the significant increase in work and mission output demands across all our mission spaces.

ENGAGEMENT WITH THE NEXT GENERATION

The Minority Serving Institutions Intern Program (MSIIP) implemented a comprehensive recruitment strategy, resulting in 830 applications submitted in 2024, a 35 percent increase over 2023. MSIIP on-boarded its largest cohort of 151 interns in 2024, a 57 percent increase.

The NNSA Graduate Fellowship Program (NGFP) expanded its recruitment strategy, resulting in the largest application pool in program history with 456 submissions.

NNSA also hosted the first U.S. Women in Strategic Trade roundtable in March, encouraging students and early career professionals to pursue careers in strategic trade controls. 



Adaptive Workforce & Resilient Infrastructure

UNIVERSITY CONSORTIA

NNSA awarded \$50 million to two university consortia supporting the basic science of nuclear security and nonproliferation while building a pipeline of next-generation experts. 

MATERIAL CONTROL AND ACCOUNTABILITY ACADEMY

The Office of Defense Nuclear Security conducted the first Material Control and Accountability Academy event, a feeder pipeline for the MC&A program at labs, plants, and sites. Accounting and STEM students from a variety of universities and colleges participated in intense multi-week instruction, followed by internships at NNSA sites.



Integrated Enterprise Management & Operations

M&O CONTRACTING

NNSA awarded the Pantex Management & Operations (M&O) contract to PanTeXas Deterrence, LLC (PXD) in June, with PXD assuming the role of prime contractor in November.

PanTeXas Deterrence, LLC (PXD) is a joint venture led by a BWX Technologies, Inc. subsidiary – it also includes Fluor; SOC, A Day & Zimmermann Company; and The Texas A&M University System. The team also includes three pre-selected small business subcontractors: TechSource, Inc., Los Alamos Technical Associates, Inc., and Mission Assurance Alliance, which is a joint venture comprising Longenecker & Associates, Inc. and Paschal Solutions.

The Pantex award is the first action under NNSA's *System of M&O Contracts* developed to minimize disruption to national security mission work, enhance competition readiness for industry partners, and optimize acquisition efforts. The SRS recompetes began, options to extend the Y-12 contract were exercised, and KCNSC and LLNL contracts were extended. 



Integrated Enterprise Management & Operations

SRS OFFICIALLY JOINS NNSA

Landlord responsibilities at SRS were successfully transitioned from the Department of Energy's Office of Environmental Management (EM) to NNSA. SRS is now considered an NNSA site, though EM equities will continue there. **j**

DEMOLITION AND DISPOSITION

NNSA dispositioned 247,000 square feet of old, outdated, and deficient buildings, trailers, and other structures and facilities, including contaminated assets.

The demolition and disposition of the former Albuquerque Complex began in March, a requisite for the construction of the new, modern John A. Gordon Albuquerque Complex. Once complete, the project will disposition more than 325,000 square feet of building space and 430,000 square feet of parking lot. **k**

SUPPLY CHAIN PROGRAM

KCNSC's Supply Chain Management Center (SCMC) achieved nearly \$400 million in enterprise-wide cost savings through commodity management, data analysis, and e-procurement tools and services. With 135 agreements valued at \$1.14 billion available to contractors, SCMC is on track enabling more than \$2 billion in enterprise-wide savings since its inception. **l**



Integrated Enterprise Management & Operations

SUCCESSFUL CONTRACTING AND SMALL BUSINESS ENGAGEMENT

In FY 2024, NNSA completed the successful execution of over \$21.9 billion in obligations and 2,321 actions. Additionally, NNSA obligated more than \$491 million in FY 2024 to small businesses.

DIGITAL TRANSFORMATION FOR OPERATIONS

NNSA has invested in digital transformations to improve efficiency and effectiveness, including developing dynamic GIS-based tools to improve situational awareness reporting; procuring and rolling out an information sharing platform for seamless emergency response communication across the enterprise; and advancing an automated performance tracker to assess the execution of NNSA's emergency response plan.

ENTERPRISE SECURE NETWORK (ESN) HUB GOES LIVE

NNSA strengthened the classified infrastructure for its ESN by establishing the ESN Hub, creating a common framework to deploy interoperable, collaborative toolsets across the Nuclear Security Enterprise. This directly supports NNSA's digital transformation goals and enables new investments in artificial intelligence. 



