

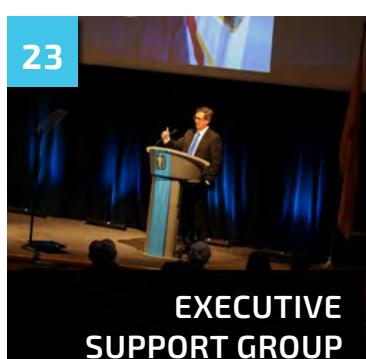
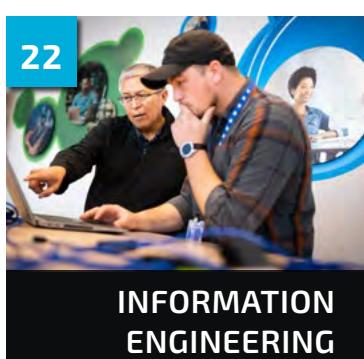
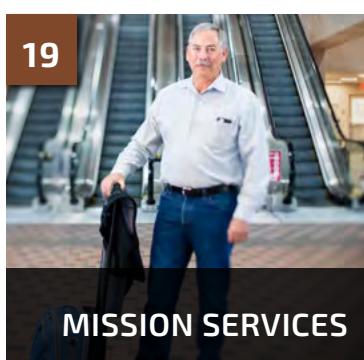
LABS ACCOMPLISHMENTS



SANDIA LAB NEWS
March 2023

Exceptional service in the national interest

CONTENTS



COVER FEATURES

Photos by
Craig Fritz



FRONT COVER

An inert nuclear gravity bomb fell 2,500 feet from a F-15E Strike Eagle, landing nose first in a dried lake bed at Sandia's Tonopah Test Range in Nevada. The weapon's parachute aided in the descent and drapes the mock B61-4 at the conclusion of the flight test Sept. 13, 2022.



BACK COVER

"I am proud to be contributing to weapon stockpile and national security. ... I like what I do, and there are opportunities to make things better. I'm still here after 40 years and wouldn't be anywhere else," said Sandia Quality Technologist Joanna Lewis, who posed for a photo as part of Lab News' "Answering the call" series in support of the Labs' Nuclear Deterrence Modernization Rally Cry in 2022.

A letter from the Labs Director



Welcome to the 2023 edition of the annual Lab News Labs Accomplishments. Here you'll find a snapshot of significant work performed in fiscal year 2022 by the remarkable staff at Sandia National Laboratories.

Behind each project is a team of dedicated, hard-working people helping solve the nation's toughest national security challenges. From critical milestones in our missions to scientific breakthroughs to powerful advances in support operations, Sandians consistently provide "exceptional service in the national interest."

Our work is needed now more than ever. Sandia's national security missions, including maintaining the safety, reliability and effectiveness of the U.S. nuclear deterrent, are evermore critical as the world faces an ever-widening array of threats.

This edition is overflowing with successes by Sandia staff. You'll read about our contributions to stockpile stewardship, nonproliferation, homeland protection, energy security, national security and international partnerships. We showed leadership in safety, quality and employee benefits. And our generosity to people in need has improved thousands of lives.

There is much here to be proud of, but it's practically impossible to cover every accomplishment. Moreover, many of our achievements have come in areas that are too sensitive for general publication.

Enjoy this look at the outstanding work done by Sandians united in their dedication to the security of this country and its citizens. It will be time well spent.

James S. Peery

Laboratories Director

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NUCLEAR DETERRENCE



B61-12 compatibility test units in flight on F-15 aircraft.

B61-12 aircraft compatibility certification

Various test activities enabled certification of compatibility for the B61-12 nuclear gravity bomb with multiple aircraft. The F-35A fighter jet, B-2A bomber and F-16A/B fighter all received initial certification, and subsequent releases of the F-15E fighter jet also were certified. (2000, 7000, 8000)



New 10-kiloampere current pulser qualified

The Primary Standards Laboratory Alternating Current Lab procured and qualified a new 10 kA current pulser for pulsed-current calibrations of current-viewing resistors and current-viewing transformers. The lab worked with a commercial company to design and build the system, which was then completed and qualified. The new pulser is completely automated. The Alternating Current Lab created software to automate the system, which reduces calibration time. (2000)

The Primary Standards Lab's new 10 kA current pulser.

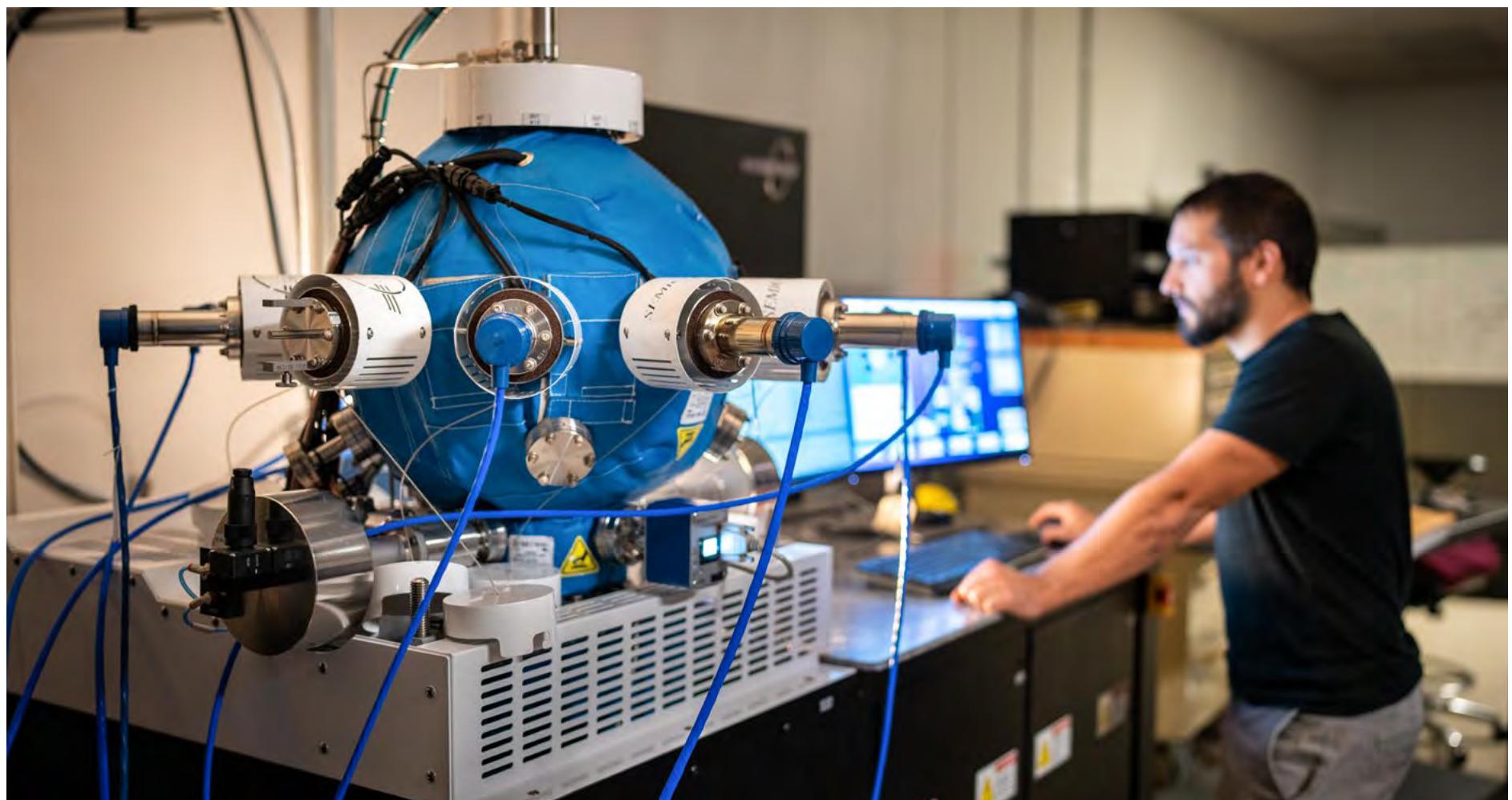
Telemetry team supports stockpile stewardship

The Telemetry Stockpile Support team assisted with the production, assembly and testing of nine different top-level telemetry assembly product lines and associated subcomponents. The effort culminated in 19 surveillance joint test assembly flight tests. (8000)

The Telemetry Stockpile Support team helped prepare a W78 joint test assembly for a flight test that launched from Vandenberg Air Force Base in California. (Photo by Ryan Quijas)



■ NUCLEAR DETERRENCE



Ultrahigh vacuum measurement system

The Primary Standards Lab's new ultrahigh vacuum measurement system.

Sandia's Primary Standards Lab qualified a new ultrahigh vacuum system that provides more accurate measurements and can calibrate up to eight customer vacuum gauges simultaneously. The system assures accurate measurements at high and ultrahigh vacuum levels (10³ to 10⁹ torr). The system qualification enables traceable vacuum gauge calibrations for the nuclear security enterprise. (2000)

Mk21 Fuze ground test success

The W87-0 joint test assembly 4a ground test unit 3B, which serves as a test bed for the Mk21 Fuze, was successfully tested, providing the Mk21 Fuze team with qualification evidence in a realistic environment. Additionally, the two W87-0 System Engineering Joint Test Assembly teams, in coordination with the Telemetry Engineering group, were able to evaluate component performance at the end of the event. The successful execution provided valuable data. (8000)

The W87-0 joint test assembly 4a ground test unit 3B, which serves as a test bed for the Mk21 Fuze, was successfully tested.



W80-4 Systems baseline design review

The W80-4 Systems team successfully executed its baseline design review — a major milestone during which an independent panel of experts from Sandia, Lawrence Livermore National Laboratory and Pantex Plant evaluated the completeness and stability of the W80-4 baseline requirements and assessed whether the program is ready to proceed to a final design. The review panel provided positive feedback in numerous areas and said it was impressed by the team's readiness and engagement leading up to the review. (2000, 8000, LLNL, Pantex)

The W80-4 Systems team successfully completed its baseline design review with an independent panel of experts, validating the program's readiness to move into production engineering.

NUCLEAR DETERRENCE

Warhead options study

The Next Generation Reentry Vehicle 60-day study team, a collaboration between Sandia and Lawrence Livermore National Laboratory, with contributions from NNSA, delivered two reports to NNSA that met all study objectives and timelines. The NGRV team assessed warhead options for postulated future Air Force reentry systems. The study ultimately will affect decisions about the future stockpile.

(2000, 8000, LLNL)

Subcomponent redesign for drop-in replacement

In collaboration with the Kansas City National Security Campus, Sandia modeled, built and tested two new subcomponent designs, showing better performance in manufacturability, safety and robustness. The design intent was to develop drop-in replacements to save production costs. The overall two-year effort spanned the full product lifecycle including prototyping and testing. The work demonstrated the ability to accelerate product realization for new concepts by using such available tools as 3D printing and modeling. (1000, 2000, 7000, KCNSC)

Model-based building predesign

Sandia used a model-based system engineering approach to conceive of and predesign its planned Power Sources facility, significantly improving efficiency, effectiveness and confidence as it transformed mission requirements into capabilities and facility design requirements. The approach provides high confidence that the building is designed to ensure the infrastructure, tooling and facility space necessary to execute mission work. (4000, 7000)

Neutron generator team makes specialized part

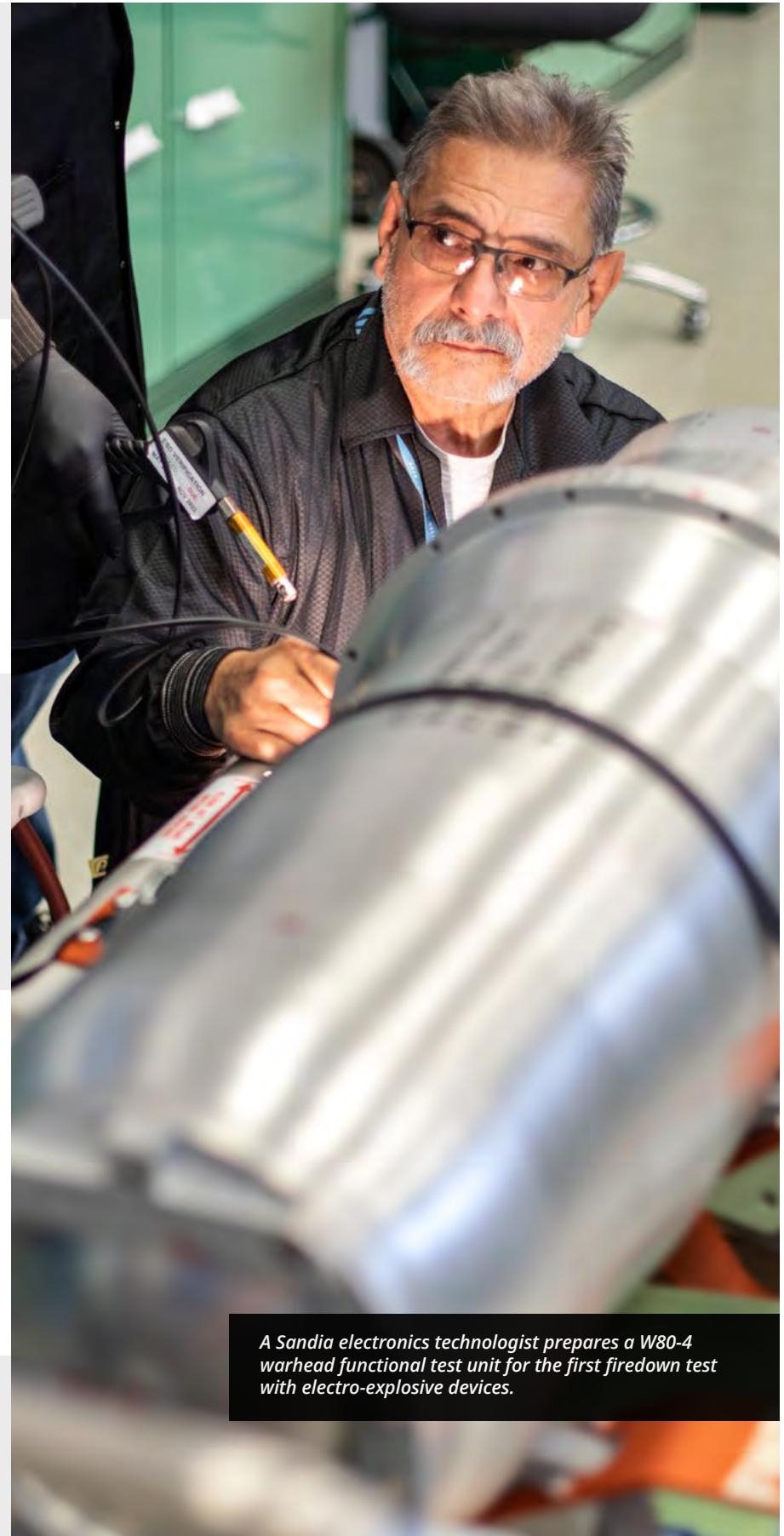
To meet an urgent need when a supplier went out of business, the Neutron Generator Enterprise established in-house manufacturing for a tight-tolerance metal part that required state-of-the-art, femtosecond laser technology. The team overcame this requirement and other significant supply chain issues to meet the Labs' commitments for neutron generator deliveries in support of the nation's nuclear deterrent. (7000)

Air Force NNSA demonstrator program

The Air Force NNSA Demonstrator Initiative is a system-level technology maturation demonstrator program that for the first time integrated early development activities with a delivery platform to show tangible results on the highest priority interfaces. The technologies matured and knowledge gained through the initiative, a collaboration between Sandia, Lawrence Livermore National Laboratory, Lockheed Martin Corp., the Air Force and NNSA, helps position the partnership to respond to future national security needs. (2000, 7000, 8000, LLNL)

B83 disassembly activities resume at Pantex

The B83 team resumed nuclear explosive assessment operations at the Pantex Plant, following a three-year hiatus. The team succeeded in developing, qualifying and implementing controls and process improvements. This effort required readiness assessments, numerous nuclear explosive safety study activities and countless on-site evaluations. (8000, Pantex)



A Sandia electronics technologist prepares a W80-4 warhead functional test unit for the first firedown test with electro-explosive devices.

W80-4 teams complete design validation testing

W80-4 Life Extension Program teams completed several major testing accomplishments, including successful execution of the first warhead-level firedown test with electro-explosive devices, the abnormal thermal high-fidelity system test and the abnormal mechanical drop test, as well as the continuation of mechanical environments testing. These tests were the culmination of months or years of effort across multidisciplinary teams, and the results are used to validate designs and further advance development of the warhead. (2000, 8000)

NUCLEAR DETERRENCE



Mk21 Fuze program achieves flight test milestone

The Mk21 Fuze program's flight test unit 3 was launched from Vandenberg Space Force Base on Aug. 16. The Minuteman III missile flight carried a production pedigree fuze and development telemetry assembled at Sandia/California, directly supporting Mk21 Modification Fuze qualification. Nominal flight trajectory was achieved, and review of the telemetry data indicated successful performance of the fuze and telemetry system. (1000, 2000, 3000, 4000, 5000, 6000, 7000, 8000, 10000)

An unarmed Minuteman III intercontinental ballistic missile launches during a test flight, successfully delivering the Mk21 Fuze program's flight test unit 3. (Photo by Ryan Quijas)

B61-12 accepted for production

The B61-12 program produced the first completely refurbished bomb in November 2021. Three months later, the program completed a qualification design review based in part on the final weapon development report. Meeting these milestones resulted in authorization for the B61-12 as a standard stockpile weapon accepted for full-rate production on June 29. (1000, 2000, 3000, 4000, 5000, 6000, 7000, 8000, 10000)

A B61-12 test unit.



Integrated stockpile evaluation at WETL

Sandia's Weapons Evaluation Test Laboratory in Amarillo, Texas, completed more than 1,400 tests, including a revival of B83 system testing and the integration of a new Mk21 Fuze tester. Sandia supported more than 15 flight tests and completed 27 component quantification of margins and uncertainties analyses, along with 15 similar analyses for modernization. (2000, 7000, 8000)

Trident II/D5 takes off during the Commander Evaluation Test-4 flight test.

Annual stockpile assessment

Sandia completed the annual assessment detailing the safety, reliability and performance of all Sandia elements of the U.S. nuclear stockpile. The process involves internal and external expert reviews of each weapon system and culminates in a letter delivered to the DOE and DOD secretaries and the chair of the Nuclear Weapons Council. This assessment is a key part of the annual report to the U.S. president on the overall condition of the nation's nuclear stockpile. (2000, 6000, 7000, 8000)

Labs Director James Peery signs the annual stockpile assessment letter.



Military Liaison stockpile support

Sandia's Military Liaison serves as the lead operational interface agent for NNSA and DOD supporting the stockpile and future weapon systems. During its 75th year, Military Liaison provided responses to resolve 775 anomalies related to war-reserve weapons, trainers and ancillary gear in the field. Military Liaison personnel wrote 4,186 pages of technical procedures to support weapons maintenance and conducted 137 weapon training classes for the nuclear security enterprise and DOD. Military Liaison was instrumental in fielding the Code Management System, Disable Management System and the B61-12 bomb. (7000)

Military Liaison team members work to validate B61-12 technical procedures.

NUCLEAR DETERRENCE



Schedule realignment approved for W80-4 program

The W80-4 program realigned its baseline schedule to better manage risk and more seamlessly integrate with the Air Force's schedule for long-range stand off missile development. Determining the most effective schedule alignment required a significant effort by multiple teams across the program over nearly two years and was conducted concurrently with the design engineering phase. The proposed realignment was unanimously approved by the Nuclear Weapons Council in June. (2000, 8000)

New Telemetry Transmitter

The High Efficiency Adaptable Telemetry Transmitter is a single-transmitter design that can replace more than 30 individual designs currently flown in joint test assemblies. The HEATT team successfully achieved qualification evaluation release and the first production unit, giving nuclear deterrence programs a common component to meet telemetry needs. The team collaborated with colleagues at the Kansas City National Security Campus to develop creative solutions to complex technical challenges. (2000, 7000, 8000, KCNSC)

W87-1 Phase 6.2A activities completed

The W87-1 team successfully completed and received NNSA approval for the site Weapon Design and Cost Report, meeting a major milestone. The team implemented lessons learned and staffed the program to meet many critical deliverables, including requirements burn-down plans, resource-loaded schedules and uncertainty analyses, joint DOD and NNSA Phase 6.2/2A reports, product definition supporting W87-1 digital engineering strategy goals and execution of an early Nuclear Explosives Safety review. The program now enters Phase 6.3. (1000, 2000, 3000, 4000, 5000, 6000, 7000, 8000, 10000)

Fielding the W88 ALT 370

In January, the W88 Alteration 370 system reached a significant initial operating milestone. The system was delivered to the Navy on schedule, and assessment results were included in the annual report. A successful design review and acceptance group led to acceptance of the W88 ALT 370 as a standard stockpile item. These achievements underpin and strengthen the nation's nuclear deterrent. (2000, 5000, 7000)

First powered flight for W80-4

The W80-4 Systems team successfully completed the program's first-powered flight test onboard a development version of the U.S. Air Force's long-range stand off missile. This major milestone validated the interface between the W80-4 warhead and the missile and provided substantial data to refine the warhead requirements and stockpile-to-target sequence. It also underscored the importance of Sandia's partnerships with the Air Force, Raytheon Technologies Corp., Kansas City National Security Campus, Lawrence Livermore National Laboratory and other nuclear security enterprise partners. (2000, 8000, KCNSC, LLNL)

3D printing of cable

The Production Integration Engineering team produced a functional, 3D-printed rigid flex cable. PIE team and Advanced Materials Laboratory engineers teamed to deploy the printer for on-site printed electronics prototyping. Jointly developing this capability contributes to the team's mission of producing quality cables quickly and efficiently in support of the nuclear deterrence mission. (1000, 7000)

Electronic Parts Program

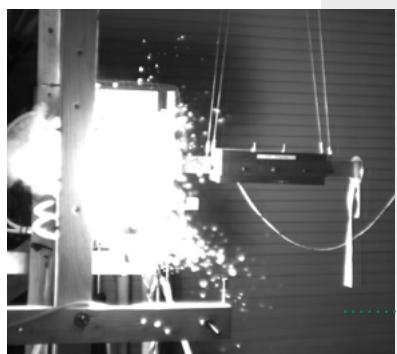
Sandia's Electronic Parts Program implemented a front-end assurance approach, ensuring the program has the required data to assert a commercial electronic part is appropriate for use in nuclear deterrence systems. The W87-1 program is implementing elements of this approach, including a Program Approved Parts List, to select commercial electronic parts that have an existing technical basis in relevant environments. This reduces technical risk and accrual of technical debt by the W87-1 program. (7000)

NUCLEAR DETERRENCE

Characterizing LTC battery cells

Using techniques from its Lithium Battery Laboratory Directed Research and Development Grand Challenge effort, Sandia established a baseline characterization of lithium-thionyl chloride cells for future aging studies. This included novel nondestructive characterization of self-discharge mechanisms, computed tomography scanning and cell disassembly procedures to verify material integrity. The study confirmed known information about cell behavior under discharge conditions and provided a solid technical basis for future aging studies. (1000, 2000, 7000, LDRD)

A Sandia employee conducts disassembly and inspection of a lithium thionyl chloride cell. (Photo by Margaret Sanchez)



100th Light Initiated High Explosive facility test

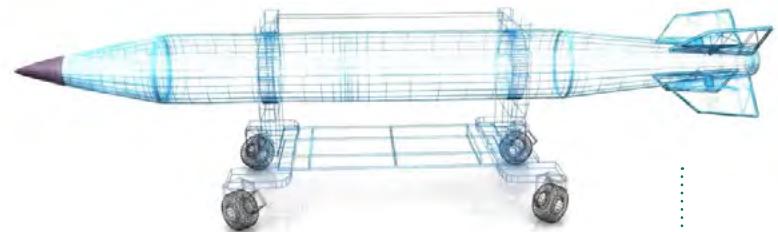
The Light Initiated High Explosive facility successfully conducted its 100th test since reopening two decades ago. Building upon the legacy of the facility, which operated from about 1970 until 1992 and reopened in 2002, the test demonstrated LIHE's enduring contribution to the nuclear weapons enterprise. An LIHE test uses explosive techniques to impart mechanical shocks into reentry systems for qualification, model validation and surveillance activities. (7000)

Sandia's Light Initiated High Explosive facility conducts its 100th test. (Photo by Malerie Baeza)

Digital engineering advances

Furthering the Labs' commitment to digital engineering, Sandia and Kansas City National Security Campus teams implemented major advances in support of nuclear deterrence. Multiple W87-1 product realization teams began using model-based definition and model-based systems engineering for early development activities. Teams also successfully deployed a classified instance of a digital engineering integration platform that allows interoperability among multidiscipline, model-based engineering tools to accelerate design.

These improvements lead to robust system architectures, more agile design iterations with production agencies and accelerated product realization. (2000, 7000, 8000, 9000, KCNSC)



Multiple W87-1 product realization teams are using model-based definition and model-based systems engineering.



Harsh environment diagnostic capabilities

Nuclear Deterrence teams made advances in determining how safety-critical environmental sensing devices behave in harsh environments. Ultrasonic transducers captured internal device motions during a rocket launch and compared them to centrifuge tests to validate device testing methodologies and computational models. In addition, improved high-speed X-rays visualized the internal dynamic response of the devices during a harsh shock. Both capabilities help Sandia ensure the U.S. nuclear deterrent is safe and reliable. (1000, 7000)

On-board computer that collects ultrasonic transducer data while in flight.

Novel 3D-printed packaging solution

Sandia designed, printed, installed and environmentally tested 3D-printed shock and vibration attenuating cushions. To print the Sandia-designed components, staff developed SliceWrite, a transformative Direct Ink Write design utility supporting complex product realization. Testing of geometrically complex silicone hardware demonstrated and proved the feasibility of a novel safety device and electronics packaging solution for nuclear deterrence, improving the producibility of modernization components while enabling rework, reuse and enhanced surveillance. (1000, 7000)

A 3D-printed shock and vibration attenuating cushion, left, and the hardware used to create it.





Thwarting maritime nuclear material trafficking

Delivering integrated maritime radiation detection training with the United Nations Office on Drugs and Crime.

Traveling to oceans, waterways and seaports across the globe, Sandia participated in multiple regional maritime security exercises to raise international awareness of nuclear trafficking, introduce radiation and contraband detection tools to improve inspections, and integrated radiation detection capabilities into ship boarding operations. In support of NNSA's Office of Nuclear Smuggling Detection and Deterrence, Sandia worked with the United Nations Office on Drugs and Crime to train personnel in Seychelles, the Maldives and Mauritius and with Naval Forces Africa in Djibouti for engagements with Senegal, Comoros, Somalia and Yemen. (6000)

Safer veterinary vaccines for Africa

Sandia's Global Chemical and Biological Security team assessed the security needs for a planned new facility for the Pan-African Veterinary Vaccine Centre of the African Union. The center provides training in diagnostics, production and quality control of all veterinary vaccines produced in and imported to Africa. Sandia's recommendations will enhance safekeeping of the material the center holds on behalf of African Union member states. Sandia has been training center members on biosafety and biosecurity for more than five years. (6000)

Plan for a new Pan-African Veterinary Vaccine Centre of the African Union lab and training facility.



Next-generation optical satellite sensor

Culminating an eight-year effort supported by more than 150 Sandians across five divisions, the next-generation U.S. Nuclear Detonation Detection System optical satellite sensor passed thermal, shock and vibration testing. Built upon the most complex component ever designed and delivered by the Microsystems Engineering Science and Applications facility, the sensor is a major technological achievement, creating an order of magnitude improvement in sensitivity to address emerging and evolving threats. (6000)



Next-generation optical satellite sensor.

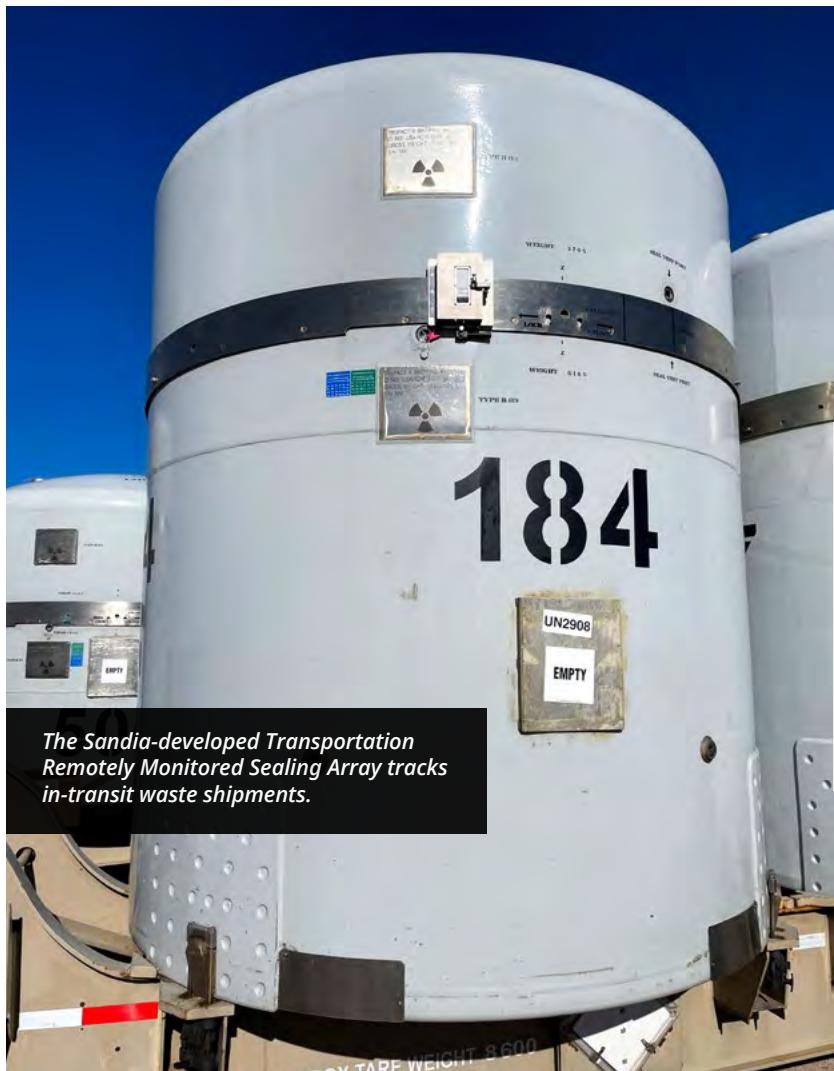
PIDS approved for Y-12 projects

The NNSA Production Office at the Y-12 National Security Complex approved the Sandia-developed Portable Intrusion Detection System. The system provides a technological means to fill security gaps created during two major construction projects — the Security Infrastructure Revitalization Program and West End Protected Area Reduction — decreasing costs and risks. This is the first time NNSA has deployed the system for use in an operational environment. (6000)

Portable Intrusion Detection System units ready for deployment.



■ GLOBAL SECURITY



Tracking nuclear waste containers

NNSA approved the Transportation Remotely Monitored Sealing Array, which tracks the location of waste shipments from the Savannah River Site in South Carolina to the Waste Isolation Pilot Plant in New Mexico and provides assurances that container materials are under necessary safeguards. The Sandia-developed system involved extensive, yearslong collaboration with Savannah River Nuclear Solutions, WIPP, the Kansas City National Security Campus and NNSA's Office of Material Disposition, Sandia Field Office and Carlsbad Field Office. (6000)

Secure-by-design nuclear energy

Sandia is working with government and industry to integrate safeguards-and-security-by-design principles into new advanced and small modular reactors to meet the growing global interest in carbon-free energy development. The Labs initiated partnerships with five U.S. industry vendors, focused on safe, reliable and secure reactor deployment. Sandia's role will be key to ensuring that these designs, which are expected to deploy domestically and internationally, will have innovative safeguards and security systems. (6000)

Mobile Guardian Transport meets milestones

Sandia's Mobile Guardian Transport team worked to overcome supply chain and staffing challenges to meet two major program milestones on NNSA Defense Programs' "Getting the Job Done in FY 22" list. The team conducted an extensive series of over-the-road environmental tests and was visited by multiple DOE and DOD sites to demonstrate handling procedures for all cargo types. The Preproduction Unit Rolling Chassis was delivered in the summer. (6000)

Space data systems deployed

Sandia designed, built and deployed two new Remote Interface Facilities that extend design life and improve reliability and information assurance for the Flexible Reliable Operational Ground System, a real-time system for space-based sensors used 24/7 by national decision authorities. The facilities are critical elements for command and control and sensor data path systems. They successfully began operation and received authority to operate for the maximum duration authority due to the government sponsor's confidence in Sandia's work. (6000)

Leading Edge Advancement Project

The Leading Edge Advancement Project is a five-year effort to build an integrated ground system to process information from strategic space assets. The latest Sandia software release demonstrated system readiness for enterprise testing by providing real-time capability to detect, track and message moving threats, thus completing the full scope of the project's initial operational capability. Sandia also designed and built a production system of three hardware environments of 100 racks of equipment with 425 servers, which was successfully installed in multiple environments. (6000)

Photovoltaics electronic processing unit developed

Sandia developed a photovoltaics electronic processing unit for acquiring, analyzing and exfiltrating data. The Field Programmable Gate Array system of the Photovoltaics for Reaction Time History project uses installed photovoltaic panels as distributed reaction time history sensors. Sandia successfully fielded full-scale photovoltaic panels and a prototype array system at the High-Energy Radiation Megavolt Electron Source III facility, demonstrating technology readiness and providing a lower cost, expanded-coverage distributed-reaction time history sensor for the nation. (6000)

Demonstration of a photovoltaics electronic processing unit.





Sandia aids Air Force security upgrades

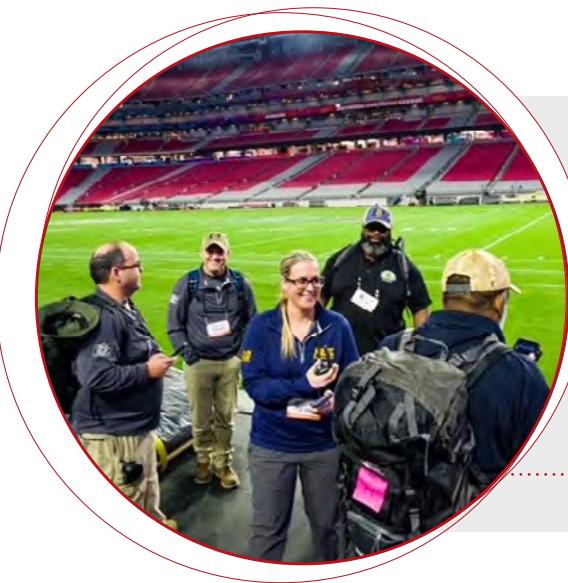
The Electronic Security System Refresh turnover at Whiteman Air Force Base in Missouri demonstrated Sandia's ability to deliver with speed and precision, ending five years in which the base sustained arduous 24/7 security postings to meet requirements. In addition, Sandia completed the first two phases of government acceptance testing on schedule and within budget for the Electronic Security System Refresh project, despite the challenges of performing significant activity-level work during the COVID-19 pandemic. (6000)

A Kirtland Air Force Base airman observes security system upgrades.

Cobalt Magnet 22 exercise

More than 30 local, state and federal agencies conducted a major radiological incident exercise in Austin, Texas. Led by NNSA, Cobalt Magnet 22 increased preparedness against radiological threats. Sandia consequence management teams aided planning and execution in remote and field activities. The culmination of 18 months of planning, the exercise simulated a radiological attack, enabling response personnel to practice protecting public health and safety, providing emergency relief to affected populations and restoring essential services. (6000)

Representatives from Sandia and other agencies participate in the Cobalt Magnet 22 exercise.



Emergency response to urgent events

The Nuclear Emergency Support Team responded to many real-world events, helping to investigate, identify and secure uncontrolled radiological materials. During the Russian invasion of Ukraine, Sandia consequence management personnel has supported requests for information from the the NNSA Nuclear Incident Team, providing crucial insights into the continually evolving situation on the ground. NEST also supported security activities for the Super Bowl, Oklahoma City Memorial Marathon and other national and international events. (6000)

Nuclear Emergency Support Team supports Super Bowl LVI.

Y-12 security transformation

The Security Infrastructure Revitalization Program at the Y-12 National Security Complex began major construction for a crucial NNSA Defense Nuclear Security Office project. Sandia's construction management and design efforts are integral to NNSA's Strategic Integrated Roadmap and addresses security improvement needs identified in its 10-year plan. The West End Security Transition subproject of the West End Protected Area Reduction project was completed and work continued on key milestones for the area's Entry Control Facility. (6000)

Sandians and partners at Y-12 construction site.



■ ADVANCED SCIENCE & TECHNOLOGY



GPU-accelerated simulations

Graphics processing unit-accelerated computational simulation is becoming mainstream for Sandia SIERRA engineering mechanics. SIERRA Structural Dynamics is fully GPU-capable for normal environmental mechanical analysis and has achieved order of magnitude performance improvements. More than half of production structural dynamics calculations now use GPU-based machines. SIERRA Thermal Fluids can now use GPUs for normal and abnormal environment thermal solves. SIERRA Solid Mechanics has GPU-enabled abnormal mechanical capabilities for a subset of elements and materials. The breadth of GPU-enabled physics will expand in the coming years. (1000)

SIERRA enables graphics processing unit-accelerated computational simulation.



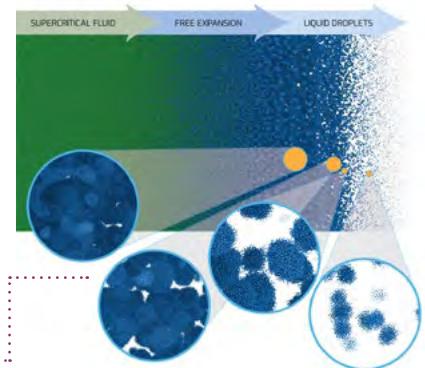
B61-11 cable pull-down test

During a cable pull-down test in September, a modified B61-11 joint test assembly unit about 500 feet in the air was accelerated into a 200,000-pound concrete target using a sled fitted with 14 rocket motors. The test at Sandia's Aerial Cable Facility preconditioned the unit for Los Alamos National Laboratory's follow-on testing. Impact conditions met test requirements, and the team captured all acquired instrumentation and photometrics. The Labs partnered with Los Alamos, NNSA, Pantex and Kirtland Fire Emergency Services for planning, design and execution. (1000, 2000, 3000, 4000, 7000, 10000)

Improved simulations of molten metal

A team updated the Large-scale Atomic/Molecular Massively Parallel Simulator's molecular dynamics code to capture the physics of expanding molten metal. LAMMPS uses the Spectral Neighbor Analysis Potential machine-learning method to measure against density functional theory. The result greatly improves model accuracy while preserving the excellent scaling of LAMMPS and enables simulations of billions of atoms on DOE supercomputing platforms. (1000)

LAMMPS simulations of free expansion of a supercritical fluid into the vapor and liquid two-phase region and subsequent formation of liquid droplets.



Quantum New Mexico Coalition

To lead New Mexico into future quantum computing realms, Sandia, the University of New Mexico and Los Alamos National Laboratory launched the Quantum New Mexico Coalition in April. Future quantum computers could run some tasks faster than ever. While the technology is still experimental, funding for its development has steadily increased worldwide as governments and businesses eye its economic and national security implications. More than 30 New Mexico colleges, businesses, labs and nonprofit organizations support the quantum's coalition. (1000, 5000, LDRD)

Chief Research Officer Susan Seestrom spoke at a symposium launching Quantum New Mexico.

Better night vision is no MIRaGE

Next-generation, night-vision systems, sponsored by the Defense Advanced Research Projects Agency's ENVision program, are supported by Sandia's MIRaGE design software for metamaterials. The MIRaGE team created an innovative, extreme-scale electromagnetics simulation capability for the planar optics, which are based on engineered metamaterials. Using a novel domain decomposition approach with tunable accuracy and asynchronous scheduling, MIRaGE helps designers simulate the electromagnetic response of metacorrectors represented by hundreds of billions of finite elements. (1000, 5000)

System-generated EMP experiments at the NIF

Sandia executed a seven-shot sequence of system-generated electromagnetic pulse experiments at Lawrence Livermore National Laboratory's National Ignition Facility. Using a complex experimental platform and advanced X-ray diagnostics, the team gathered measurements for code validation. Five separate X-ray sources drove currents in physics-based cavities and larger complex cavities. Collaboration between DOE's Weapons Survivability and Advanced Simulation and Computing programs improves predictions from system-generated electromagnetic pulse experiments for nuclear weapons in hostile environments. (1000, LLNL)

ADVANCED SCIENCE & TECHNOLOGY



Advanced diagnostics for stockpile stewardship

Sandia continues to develop advanced diagnostics that improve stockpile stewardship measurements in partnership with Los Alamos and Lawrence Livermore national laboratories. The Z Line VISAR, or velocity interferometer system, developed with Lawrence Livermore to make key fusion target measurements, is used today by the three laboratories to support four NNSA programs. Other new diagnostics that improve modeling are ultrafast X-ray imagers for time resolution and greater spectral coverage, new nuclear burn duration measurements to understand fusion fuel confinement time and multiframe radiography that doubles Z data output. (1000, 5000, LANL, LLNL)

A researcher installs final Z Line VISAR optics. This provides crucial data for scaling toward next-generation pulsed power capability.

Faculty Loan Program for university partnerships

Staff are collaborating with faculty from six universities for joint appointment opportunities through the Labs' Faculty Loan Program: the University of New Mexico, University of Texas at Austin, New Mexico State University, Purdue University, Auburn University and the University of Arizona. Partnerships across Sandia were critical to establishing the program, which will deepen Sandia's strategic relationships and increase the diversity of staff working with universities. (1000, 11000)

Plutonium aging investigated at Z

Accurate measurement of plutonium behavior is crucial for assessment of the nation's nuclear weapons stockpile. In partnership with Los Alamos National Laboratory, Sandia designed, conducted and analyzed plutonium experiments at the Z Pulsed Power Facility comparing new and decades-old plutonium. A multidisciplinary effort resulted in new plutonium capabilities at Z, enabling Sandia and LANL to meet stringent uncertainty requirements. The data is used to validate material models of aging and contribute foundational information for decisions about pit production capacity. (1000, LANL)

Successful hypersonic materials flight tests

Two successful flight tests provided a hypersonic, high-temperature environment to validate designs of shear stress sensors, high-frequency pressure sensors and an ultrasonic recession gage. For one vehicle, Sandia manufactured the thermal protection system and provided a series of instrumented thermal plugs built from new ablation-resistant materials. For both vehicles, the team applied an ablative and insulative coating on the rocket motor fins. The thermal protection system materials protect vehicles from the extreme temperatures encountered during hypersonic flight. (1000, 5000)

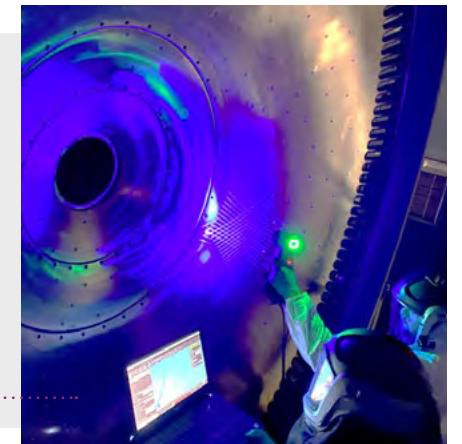
Taming mechanical environments

Sandia researchers developed metamaterials that trap, redirect and transform mechanical energy. Two Laboratory Directed Research and Development project teams collaborated to design and build prototype materials for testing at laboratory scale in a rocket launch and at the SPHINX accelerator and Z Pulsed Power Facility. One test article showed reduced transmission of mechanical energy around specific, targeted frequencies, and others survived thermomechanical shocks induced by radiation. Sandia was recently granted two patents related to this work, which now supports multiphysics analyses for the W87-1 modernization program. (1000, LDRD)

Improvements to Z operations

By adopting a split shift for Z Pulsed Power Facility operations, the time available to prepare and load hardware was extended by six hours a shot with minimal additional staff, compared to the previous operational model. Sandia demonstrated major operational efficiency and quality improvements for Z machine's most complex experiments. Examples include the execution of two consecutive plutonium experiments in eight days in March, compared to six days per shot in 2020, and two consecutive tritium experiments in four days in May, versus four days per shot in 2020. (600, 1000, 6000)

The Z Pulsed Power Facility evening operations team complete a 3D scan of Z's magnetically insulated transmission line.



Sandia invents new AI algorithm

Sandia's Beyond Fingerprinting Grand Challenge LDRD team invented a new machine learning algorithm called the physics-informed multimodal autoencoder. It offers a new way to fuse data from multiple sources alongside governing equations to enable more robust scientific predictions. While originally developed to integrate data from multiple experiments and simulations into a single decision platform, the algorithm has potential use in many domains, from climate change to quantum mechanics. The physics-informed multimodal autoencoder was submitted for a patent in May 2022. (1000, LDRD)

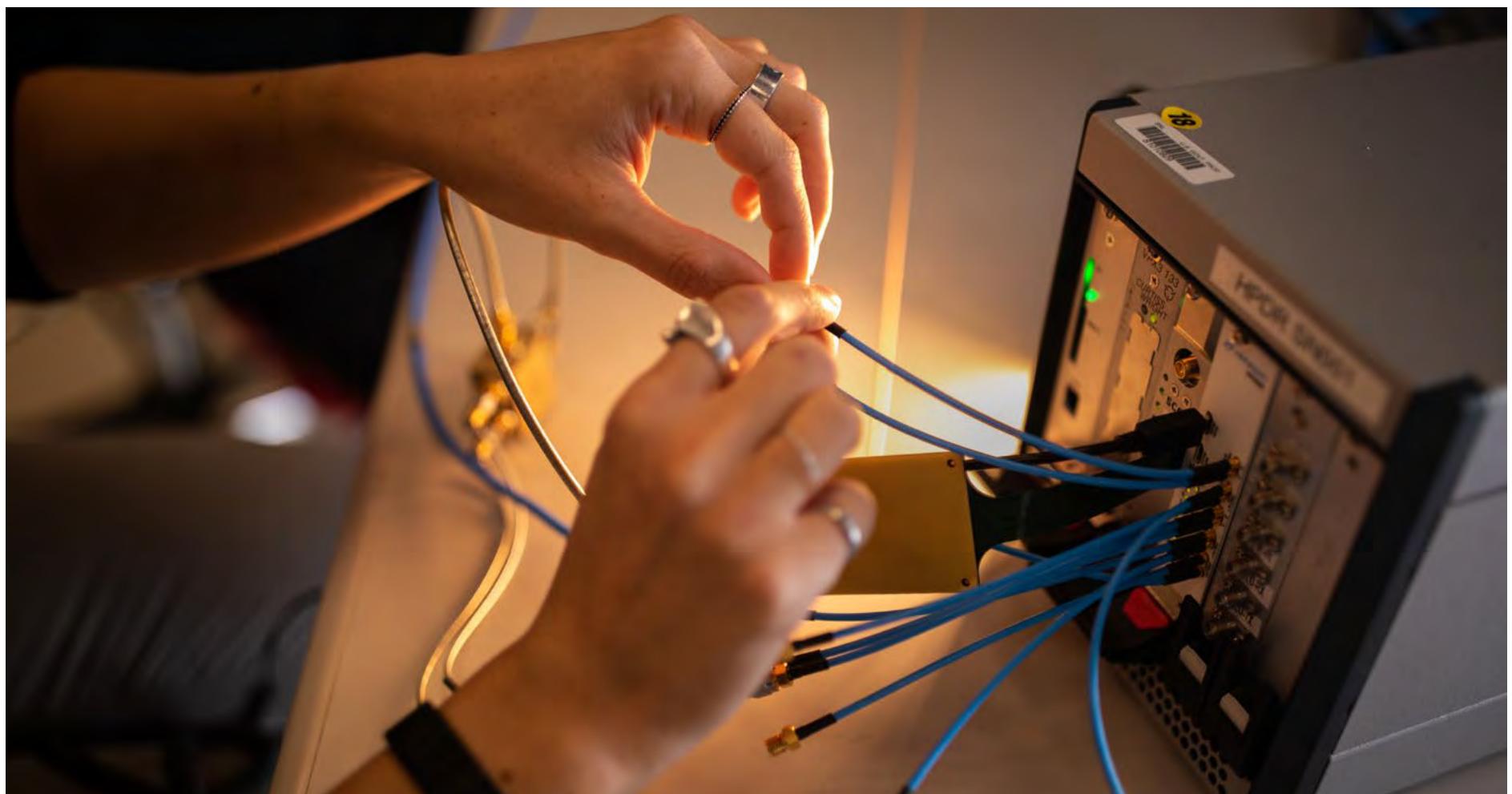
Reactor-based fissile material experiments

To support nuclear weapon modernization, a Sandia team restarted reactor-based fissile material experiments at the Annular Core Research Reactor. The experiments measure the response of fissile materials to environments with combined neutron, gamma and mechanical shock. Experiments required collaboration with Los Alamos and Lawrence Livermore national laboratories. (600, 1000, 4000, 8000, LANL, LLNL)

Bay Area postdoc research SLAM

Sandia launched the Bay Area Research SLAM with Lawrence Livermore, Lawrence Berkeley and Stanford Linear Accelerator national laboratories. In the inaugural event, 12 postdoctoral researchers presented compelling aspects of their research on the virtual stage. Sandia participants agreed that the biggest challenges were the limitations of one static background slide, three minutes strictly enforced and no props to accentuate key points. (1000, 8000)

NATIONAL SECURITY



Agile waveform development for radar

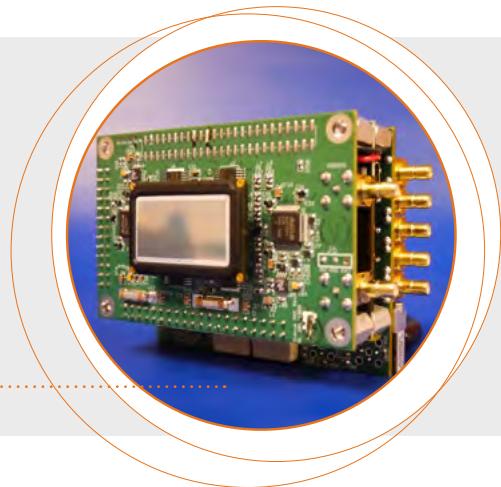
A firmware developer works with a toolbox-sized prototype for Multimission Radio Frequency Architecture.

Three teams — Multimission Radio Frequency Architecture; Agile Waveform Laboratory Directed Research and Development; and Radar Analysis, Modeling, Simulation and Emulation Suite — successfully completed lab-bench tests demonstrating a new waveform-agile radar capability via real-time matched-filter processing in hardware. The teams plan a flight test to further demonstrate these radar capabilities. (5000, LDRD)

Commercialization of ultrafast imagers

Sandia has invented the world's fastest burst-mode camera to look at nuclear fusion in real time, and now the technology is going commercial. The Labs is licensing patents for the ultrafast imager technology to Advanced hCMOS Systems LLC, co-founded by former staff members. After commercialization, the cameras could be more widely available across the DOE complex, and for medical imaging and university research. (1000, 5000)

A Sandia-developed ultrafast X-ray camera.



Technical and mission integration for hypersonics

Sandia served as the technical and mission integrator for the first Joint Flight Campaign mission of the conventional prompt strike all-up-round missile for the Navy and Army. The test was the first flight of a purpose-built, two-stage rocket that will deliver hypersonic weapons to fulfill a high-priority mission need for the nation's warfighters. Sandia also secured the enduring role as design agent for the common hypersonic glide body. (1000, 2000, 5000, 10000)

Joint Flight Campaign 1 for the Navy's conventional prompt strike and Army's long-range hypersonic weapon programs on June 29 at Sandia's Kauai Test Facility in Hawaii.

NATIONAL SECURITY

Falconer: sounding rocket payloads

The Falconer team developed three experimental flight-worthy payloads and ground-test equipment in support of two sounding rocket flights. The team planned and executed six static field tests and assembled four flight payloads in five months, addressing a critical national security challenge. The team built on decades of radio frequency expertise, a maturing technology, to deliver the payloads. In recognition of this success, the team received a Team Employee Recognition Award. (5000)



Cyberdefense for critical infrastructure

More situational awareness for industrial control systems, or MOSAICS, is a new comprehensive, integrated and automated cyberdefense capability for industrial control systems. It enables system operators to more quickly, easily and effectively detect and characterize cyberattacks against critical infrastructure systems in real time. The MOSAICS Joint Capability Technology Demonstration successfully completed a program to deliver the first operational cyberdefense capability for a live electrical distribution system. (5000, INL, PNNL)

Foreign Nuclear Weapons Intelligence Initiative

The Labs' Foreign Nuclear Weapons Intelligence Initiative received the National Intelligence Meritorious Unit Citation award from the Office of the Director of National Intelligence, capping the group's most successful year since its inception in 2010. Sandia teams completed 26 technical assessments, exceeding the goal of 15. The award recognizes the strategic planning and high-quality analyses that Sandia provided to the national intelligence office. (1000, 5000)

Sidetrack engages UAS threats

The Advanced Engagement Systems team in the Next-gen Communication Solutions group delivered final Sidetrack units, successfully completing all system requirements. Sidetrack provides an advanced electronic warfare engagement capability through a platform-agnostic hardware set capable of targeting unmanned aerial system threats in a single payload. The team transitioned Sidetrack to operations and maintenance and began future upgrades. The team plans to provide ongoing operations support for users as they exercise the system. Sidetrack has fostered key partnerships while demonstrating the Labs' technical expertise. (5000)

World's first ion trap qubits with integrated photon detectors

The Labs recently demonstrated the world's first surface-ion trap with integrated single photon avalanche detectors, enabling the trapping and detection of an atom of ytterbium by sensing the individual photons emitted by the trapped atom. The demonstration is a key step toward the realization of low-power, highly accurate, compact atomic clocks with important applications for future quantum computers and sensing systems based on trapped ions. The work was featured on the cover of Applied Physics Letters. (5000)

A conceptual solid model rendering of a 0.5 liters miniaturized ion clock based on surface-ion trap technology.



Advancing hypersonics through low-cost rockets

The High Operational Tempo for Hypersonics team launched two sounding rockets from NASA's Wallops Flight Facility in Virginia to support the Navy's Conventional Prompt Strike and the Army's Long-Range Hypersonic Weapon programs. They came nearly a year after the first successful H4H campaign launched three sounding rockets carrying 23 experiments. The latest campaign flew nominal lofted and depressed trajectories carrying 24 experiments. The depressed-trajectory rocket spent approximately 56 seconds above Mach 9 — achieving a new relevant hypersonic environment flight profile. (1000, 2000, 3000, 4000, 5000, 6000, 7000, 8000, 9000, 10000)

Twitcher: antispoofing navigation technology

Sandia's Navigation, Pointing and Control and Systems Integration team developed several signal-processing algorithms to simultaneously track multiple GPS positions in a noisy environment. The team successfully tracked multiple GPS signals and distinguish between spurious and accurate signals. (5000, LDRD)

■ ENERGY & HOMELAND SECURITY



Enabling next-generation nuclear power

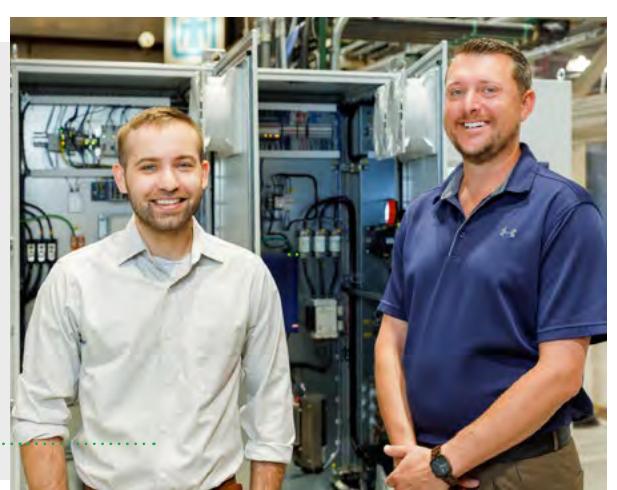
Sandia researchers examine remnants from a series of lower head failure experiments. Results from experiments like these are used to update Melcor, Sandia's nuclear-accident modeling software.

Sandia updated its Melcor and MACCS engineering software to help the U.S. Nuclear Regulatory Commission and the domestic and global nuclear industry better understand and enhance the safety of next-generation, advanced nuclear power plants. The Labs shared Melcor's new capabilities at a series of public meetings, demonstrating how the improved software will enable the development, licensing and deployment of safer domestic nuclear reactors, critical to achieving U.S. clean energy goals. (8000)

Brayton cycle joins the grid

Sandia researchers for the first time delivered electricity produced by a new Brayton cycle power-generating system to the electrical grid, providing power to Sandia and Kirtland Air Force Base. The system uses heated supercritical carbon dioxide instead of steam to generate electricity and is based on a closed-loop Brayton cycle. The team now is modifying the system to operate at higher temperatures — 1,000 degrees Fahrenheit and above — and thus produce power more efficiently. (8000)

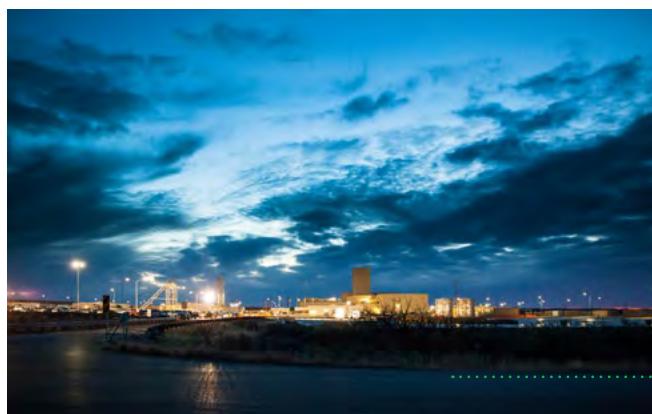
Sandia mechanical engineers stand with the control system for the supercritical carbon dioxide Brayton cycle test loop. The system delivered electricity to the grid for the first time in 2022.



Waste Isolation Pilot Plant recertification

The Environmental Protection Agency recertified the Waste Isolation Pilot Plant in May, a process that required evaluating changes at WIPP and confirming that the facility meets all disposal regulations. Achieving recertification was critical to ensure that the U.S. can continue to permanently dispose of defense-related transuranic radioactive waste. Sandia's technical contributions accounted for roughly 70% of the recertification application's content. (8000)

Building on the Waste Isolation Pilot Plant's 45-year history, Sandia is shaping technical solutions to national nuclear waste management challenges beyond the disposal of transuranic waste. (Photo courtesy of DOE)



ENERGY & HOMELAND SECURITY

Optimizing Strategic Petroleum Reserve drawdown

Sandia's Strategic Petroleum Reserve team supported national efforts to address global energy shortages by enabling the largest release of oil reserves in history — 1 million barrels of oil per day for six months. Sandia's expertise in underground storage, crude oil and salt caverns helped DOE to optimize cavern and inventory selection while mitigating unprecedented stresses on infrastructure and inventory. As a result, DOE met the nation's need to release oil quickly and safely to U.S. markets. (1000, 8000)

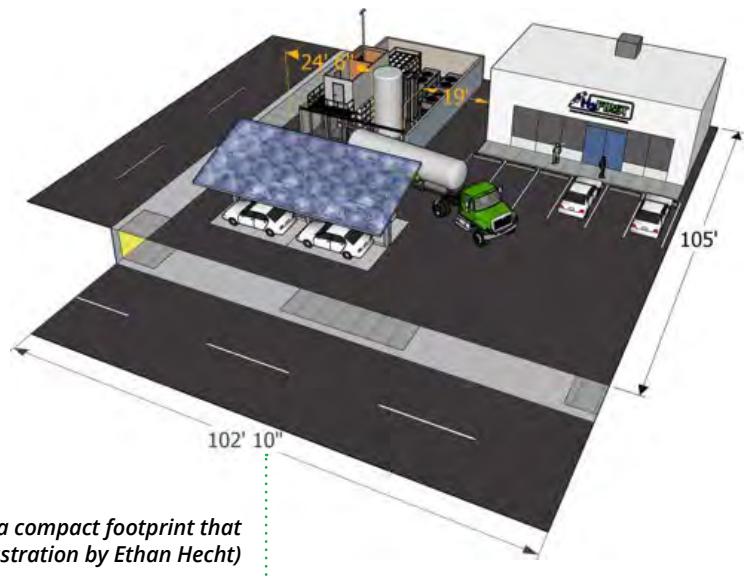


Supporting cloud computing migration

U.S. government agencies look to the Department of Homeland Security's Cybersecurity and Infrastructure Security Agency for guidance on cloud cybersecurity recommendations, and Sandia plays a critical role in advising and enabling CISA in its mission. Sandia helps design cloud-based, cross-government data-sharing and communications platforms; assess cloud visibility and inform telemetry collection to detect advanced cyber threats; and develop and demonstrate operational analytic capabilities to detect cloud intrusion. These advances collectively support CISA and U.S. government's ongoing migration to secure cloud-based information technology. (5000, 6000, 8000, 9000)

Improving hydrogen fueling stations

Sandia experiments and validated models for hydrogen fueling station safety provided the technical basis to greatly reduce the distances that tanks storing liquid hydrogen in bulk must be from other infrastructure. The findings informed revisions to the National Fire Protection Association's 2 Hydrogen Technologies Code, enabling smaller footprints and lower costs for fueling stations. The work supports DOE's hydrogen program goal of reducing the footprint of liquid-hydrogen fueling stations by 40% compared to current, 2016 code requirements. (8000)



Supporting Puerto Rican energy resilience

Sandia teamed with Pacific Northwest National Laboratory and DOE to study options for electricity generation in Puerto Rico to meet carbon-free targets. The effort addressed critical loads, cost constraints, land-area requirements, energy storage and operational resilience during and after hurricanes and other events that test the grid. Sandia staff worked with community leaders, university professors, business owners, Puerto Rican authorities, national laboratory partners and federal government representatives — including Secretary of Energy Jennifer Granholm — to develop a plan for grid resilience and distributed-energy research in the wake of Hurricane Fiona. (8000, PNNL)

Sandia energy researchers and Secretary of Energy Jennifer Granholm, second from left, helped develop a plan for grid resilience and distributed-energy research in Puerto Rico. (Photo courtesy of Matt Lave)



CLIMATE SECURITY



Wilson Center collaborates on Arctic methane

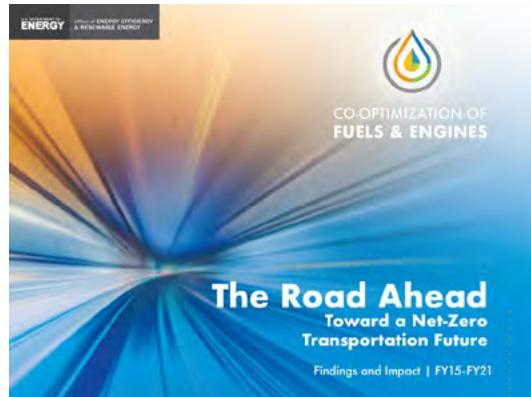
Thawing Arctic permafrost could represent a climate tipping point.

Current estimates indicate that the release of Arctic methane from thawing permafrost could consume 25%-40% of the global carbon budget toward a future global temperature increase of 1.5 degrees Celsius, enough to substantially negate global climate mitigation efforts. Understanding the probability of such a release and its potential time span is critical. Sandia partnered with the Wilson Center, non-partisan policy forum, to lead a workshop on the topic with experts from government, academia and the national labs and produced a report identifying key science and policy gaps. (500, 8000)

Scaled Wind Farm Technology facility restart

The Scaled Wind Farm Technology facility in Texas resumed full-scale operations in April after major safety and infrastructure improvements. Two months later, the SWiFT team installed a new rotor on a SWiFT wind turbine. By October, as part of the National Rotor Testbed program, the team had conducted blade strain experiments using a second turbine, demonstrating that a Sandia-designed scaled rotor can replicate wind-wake effects on megawatt-scale wind turbines. The developments exemplify the facility's impact and future potential in wind technology development. (8000)

A new rotor installed in 2022 on the A2 wind turbine at the Scaled Wind Farm Technology facility near Lubbock, Texas. Sandia's premier testing lab for innovative rotor designs, will help measure turbine performance in a wind farm environment. (Photo by Tim Riley)



Net-zero carbon transportation advances

During DOE's Co-Optimization of Fuels & Engines initiative, Sandia discovered a combustion phenomenon: certain biofuels "hyperboost" octane in gasoline, improving engine efficiency. Sandia developers also developed a suite of software tools for predicting biofuel properties and bio-informed retrosynthesis, a process that identifies the biological-chemical reactions needed to create desired biological products or compounds. The Labs also demonstrated the initial production and scale-up of a new class of heavy-duty transportation fuels that improve performance and lower particulate and carbon emissions beyond bio- and renewable diesel. (8000)

The Co-Optima findings and impact report spotlights innovations in engine and fuel research over the collaborative national six-year initiative, which concluded in 2022. (Image courtesy of DOE)

New travel agency



Sandians like technologist Steve Montgomery are booking travel through the new designated travel agency.

Sandia successfully changed its designated travel agency, capitalizing on an existing parent-company agreement. The agency was carefully selected and can handle Sandia's travel volume. The agreement reduces costs and improves user experience by incorporating single sign-on and live chat functions. Adopting the new tool and platform resulted in 95% of travel booked through the tool instead of agents. (10000)

Savings through property management



Reapplication team members load computers during Sandia's Annual K-12 Computer Donation event.

Property Management and Reapplication and its customers earn or save taxpayers significant costs through reuse, transfer, donation and sales programs. Savings and cost avoidance this year of nearly \$17.4 million were due to transfers to and from Sandia and other agencies, \$13.6 million; sales and recycling, \$566,000; trade-in and exchanges, \$586,000; donations and gifts, \$338,000; and K-12 school donations, \$2.3 million. About 10,400 visitors to Reapplication benefited from these initiatives. (10000)

Integrated Assessments Working Group

The Integrated Assessments Working Group was launched to provide a Labswide forum for sharing information and best practices among assessment professionals. The forum will enable assessment groups to focus on the Labs' highest risk areas, reducing the assessment burden and driving continuous improvement. (10000)

Assurance system improvements

The Labs conducted benchmarking activities with Lawrence Livermore and Los Alamos national laboratories to improve the sharing of lessons learned and metrics for better management of issues and risks. Sandia collected feedback and identified opportunities to simplify and improve assurance-related technology modules and associated business processes. Sandia developed and deployed an effective causal procedure, generated plans for multiple functional areas and updated the technology modules to reflect policy changes. (10000)

DOE recognizes small-business program

The DOE Office of Small and Disadvantaged Business Utilization recognized Sandia's small-business program manager and team. The team leads supplier diversity efforts and ensures that small businesses have equitable opportunities to support the Labs. Sandia exceeded all of its small-business goals, increased nationwide small-business spending and met all requirements of its DOE management and operating contract. Sandia's small-business program manager was named Facilities Management Contractor Small Business Program Manager of the Year, and Sandia's Supplier Diversity Mentor-Protégé Program received DOE's Mentor of the Year award. (10000)

Interagency agreements process

Sandia completed a multiparty structured improvement activity with NNSA's Sandia Field Office, Management and Budget organization and Acquisition and Project Management office to define the end-to-end process for interagency agreements funding and lay a foundation for enhanced process performance and improved customer experience. The process resulted in a standardized workflow with a target cycle time of 108 days, compared to the previous cycle time of more than 360 days. NNSA asked the Labs to share the process with other management and operating contractors, and it was implemented across organizations. (10000)

Streamlining shipping

WebShipper 3.0 was released to ensure the shipping process remains efficient and to make it easier to use. The application has a new look and feel with a streamlined approach that speeds up shipper submissions, reviews and approvals. Improvements to the shipping process resulted in faster processing times and more customizable approaches for reviews. Since its release, shipments have increased 16% over the pre-pandemic volume. This year, the team executed a record 12,600 shipments and moved more than 15,000 packages. (10000)

Improving assurance processes

Sandia applied management operating system concepts Labswide to improve assurance processes, making connections between concepts and performance monitoring and improving automation of operational metrics. Sandia created a more streamlined design for its main reporting site, Tier 5, and connected components of the site to capture and track actions and communicate issues to lower tiers. (10000)

Record procurement spending

Sandia spent a record of more than \$1.8 billion in procurement. Over the last five years, Sandia increased procurement spending by about \$500 million and small-business spending by about \$400 million. (10000)

■ INFRASTRUCTURE & SECURITY OPERATIONS



A stronger hybrid workplace

The hybrid work team designed and opened three new centers on the New Mexico campus to enable collaboration, innovation and teaming. The new collaboration centers provide workers with temporary offices when working on-site. The hybrid work team also maintains more than 150 global touchdown spaces. Telecommuters who work from home have vacated thousands of additional square feet to implement the Strategic Capital Space Plan to create efficiencies and address priorities. (4000, 9000, 10000)

New collaboration centers provide working areas to telecommuters when they are on-site.

Security leadership development program

The third class of Sandia security professionals graduated from the Safeguards and Security Future Leadership Development Program, established in 2017. The yearlong program involves monthly sessions that include leadership development exercises, presentations and panel discussions, individual mentorship and group projects. The 11 participants were selected through a rigorous nomination process and represented diverse security backgrounds with varying levels of experience. The program has improved continuity of security operations through knowledge transfer and has produced consistently strong management candidates. (4000)

Accelerated space solutions for the W80-4

Facilities staff demonstrated agility by quickly providing space for a new, high-priority nuclear deterrence project. The short timeline required accelerated design and construction to renovate the space for mission use. Staff members prioritized needs to provide extensive space and construction support at the New Mexico and California sites, creating critical office, storage and laboratory test infrastructure to meet a timeline extension for the W80-4. (4000, 8000, 10000)

Reimagining conference room design

Sandia successfully completed an initiative to make the experience of end-to-end enterprise video collaboration more consistent and less complex for users, resulting in new system designs and simplified videoconferencing room endpoints. All previous user touch points were consolidated into a single panel for 113 conference rooms across Sandia sites. (8000)

Infrastructure investment for Power Sources

The Power Sources Capability project represents one of the first major — \$50 million plus — infrastructure investments at Sandia in the past decade. The project team worked with NNSA to develop a revised conceptual layout that integrated cost-efficient engineering recommendations, reducing square footage and budget. The project achieved critical-decision approval in December 2022, which authorized and funded the start of preliminary and final design activities. (4000, 7000)

Conceptual rendering of the Power Sources Capability facility.



Major infrastructure projects

With funding from the NNSA Infrastructure Recapitalization Program, Facilities staff successfully completed five major projects: Thermal Spray Research Laboratory Facilities Revitalization; SiFAB Uninterruptible Power System Upgrade; Tech Area IV District Chilled Water System Upgrade; including a new central utility building; Process Oil Storage Tanks Replacement; and the California Potable Water System Revitalization General Plant Projects. These investments will reduce risks to safety and programmatic performance, increase enabling infrastructure sustainability and reliability and eliminate associated deferred maintenance. (1000, 4000, 8000)

HR, COMMUNICATIONS & HEALTH SERVICES



Community engagement and culture

A group of volunteers plant vegetables at the Rio Grande Food Project in April. (Photo by Meagan Brace)

Employees donated \$1.4 million to local nonprofits for education, family stability and community leadership; gave more than \$4.8 million to nonprofits through the United Way of Central New Mexico; and raised more than \$100,000 to support New Mexico wildfire recovery efforts. Employees also donated blood, holiday gifts, shoes, coats, books and school supplies. Additionally, Sandia established a new chief culture officer and office to demonstrate the Labs' commitment to helping employees thrive. (3000)

Enhancing employee engagement

Based on feedback from the May 2021 employee engagement survey, Human Resources launched several efforts to enhance the employee experience: the Sandia Spark initiative to recharge the future from within; Sandia's first weeklong Careerapalooza with more than 1,000 participants; a career development office that serves as a one-stop shop for resources and roadmaps to help employees achieve their goals; and Inclusion, Diversity, Equal Opportunity and Affirmative Action learning and awareness sessions to increase employee resiliency and foster a more inclusive work environment. (3000)

Improving recruitment and retention

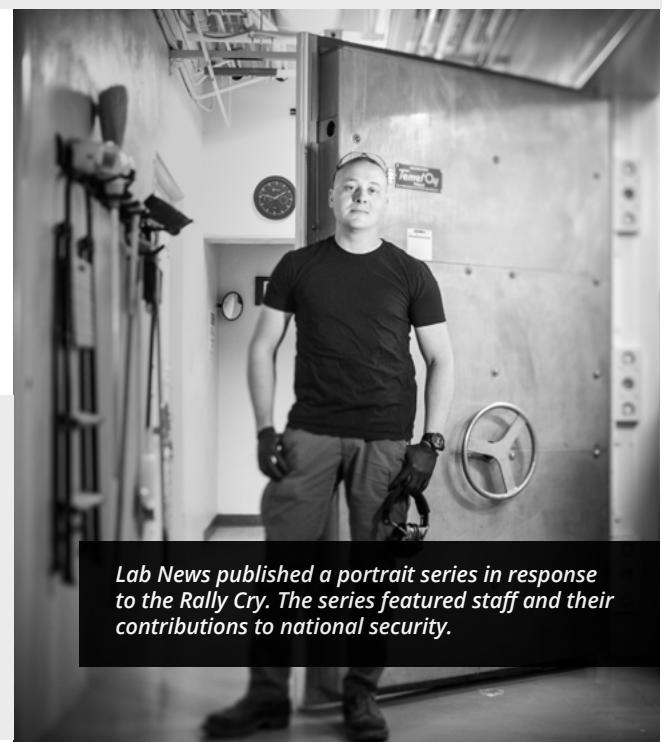
In response to the nationwide hot job market, Human Resources accelerated recruiting and focused on increasing retention. The Labs increased promotion opportunities, implemented several compensation program enhancements, provided new flexible benefit options and savings opportunities and increased the budget for University Education Programs by \$3.3 million to expand the Critical Skills Recruiting Program. The program helps recruit and retain technical talent for critical mission areas. (3000)

California Employee Health Services accreditation

California Employee Health Services renewed its accreditation with the Accreditation Association for Ambulatory Health Care. The renewal process takes place every three years and requires an extensive site survey at the outpatient medical clinic and passing a rigorous standards for safe, high-quality patient care. This collaborative effort with the New Mexico Employee Health Services team drew praise for robust wellness incentives, preventive health programs and outstanding behavioral health services at both sites. (3000, 8000)

Employee Health Services COVID-19 response

Sandia received the Secretary of Energy Honor Award for being the first national lab to implement COVID-19 testing capabilities for exposed and symptomatic employees and staff who needed volunteer testing for personal reasons, such as travel. While drive-up clinic testing ended in fall 2021, Employee Health Services continued to manage patient care and order tests for employees. Employee Health Services also rolled out serial testing to ensure unvaccinated employees could test before coming on-site. (3000)



Lab News published a portrait series in response to the Rally Cry. The series featured staff and their contributions to national security.

Rally Cry support

Human Resources, Communications and Employee Health Services teams rapidly responded to support Sandia's Rally Cry. Staff quickly created a website and process to collect volunteer resumes, filling many critical positions with internal candidates. The labs collected and managed more than 30 improvement ideas from employees, developed key messages and shared powerful, inspiring stories and visuals to increase Labswide awareness. They also created a new technical recruiter role and a mechanism to bring back retirees. (3000)

■ INFORMATION ENGINEERING

Sandia IT helps NNSA move

To help NNSA move into its new building in Albuquerque on time, Sandia Information Technology provided 6,000 feet of 144-strand single-mode fiber and 6,000 feet of MaxCell for network and phone capabilities. In addition, Sandia's IT and Cyber Assurance organizations worked with the Sandia Field Office for SFO renewal of authorization to operate the Sandia voice network system, which included use of Voice over Internet Protocol services for the new building. (9000)

NNSA Administrator Jill Hruby tours the new Albuquerque facility.



Office 365 expansion

Information Technology teams introduced additional Office 365 applications and tools. Experts from IT, Cyber Security and Communications collaborated to enable new cloud capabilities and services that enhance identity and data security, advance threat protection and improve the management, tracking and collaboration of work, and deployed infrastructure that allows the Labs to build end-to-end business solutions. The evolution of Office 365 is expanding the security of Sandia's computing environment and increasing productivity. (3000, 9000)

Improving technology for new employees

With the growth of hybrid work, an existing issue became critical when only 48% of new hires could connect to the network on their first day of work, and many virtual and remote workers couldn't connect in the first week. In response, Sandia Information Technology developed the New Employee Support Team, which works closely with new hires to set up hardware, software, authentication and network access. The team dramatically improved the new employee experience, as 97% now can connect following orientation. (3000, 9000)

SOTERIA enables software without surprises

Sandia Cyber Security pioneered Software for Trust, Evaluation, Reliability and Information Assurance, a system that provides insight into software and its providers and enables risk-based decisions about internal processes, such as supply chain risk management, application request administration and software governance. The system delivers a holistic view of software assurance using automated, scalable methods to provide actionable data and increases due diligence in national security contexts. (9000)

Security key authentication

Sandia is the first national laboratory to implement federally compliant multifactor authentication with a security key. Information Technology worked with a vendor on a pilot to use the key for personal identity verification credentials, from Sandia badges to security keys. Users then sign into Sandia computers and networks with the security key. This provides a phishing-resistant authentication method and shields badges from public view when staff are traveling. Sandia's multitool security keys also hold FIDO2 cloud authentication and one-time password credentials. (9000)

Engaging next-generation cyberdefenders

The Tracer Forensic Incident Response Exercise pulls together research in the latest cybersecurity adversarial tactics for an immersive educational experience. Coordinating with Sandia Recruiting and the Academic Alliance, the Tracer team held cybersecurity workshops at universities across the U.S. to build Sandia's diverse cyber workforce through its pipeline program. The group has converted dozens of interns to full-time positions and helps retain talent from the Cyber Residency program. Additionally, the program generates robust datasets used in cyber research. (9000)

Leadership for NNSA-wide cyber center

Sandia led the establishment of a governance structure for the NNSA Center of Excellence in Cyber Threat Intelligence with a new chair from Lawrence Livermore National Laboratory, increasing cross-site engagement. Threat-hunting efficacy increased by creating and distributing actionable compliance and anticipatory hunting profiles to Center of Excellence member sites, so each can search and address any indicators of compromise. (9000, LLNL)

Walk-up technology support bar

During the pandemic, Information Technology established a walk-in facility so staff working from home could safely get hands-on computing support. The idea grew into a permanent, off-base technology help center in New Mexico. There, users receive walk-in computing, mobile device, password and general technology support, usually the same day. The remodeled space features comfortable seating with Wi-Fi connectivity so people can work while they wait. Sandia/California recently deployed a similar service in Livermore. (9000)

Sandians receive IT assistance from support staff at the off-base technology help center.



EXECUTIVE SUPPORT GROUP ■



Ombudsman office relaunched

The Executive Services Group relaunched the Sandia Ombuds Office, originally established in 1992, under a charter from the Labs director. Sandians again have a voluntary, independent, informal and confidential way to discuss workplace issues or concerns with an impartial professional who listens, reframes and offers options. In the first year after relaunch, the ombuds visited Sandians who raised issues primarily concerned with manager-supervisor and peer-colleague relationships. (ESG)

Sandia Ombuds Ronnie Thomson is an informal and confidential resource.

Energy secretary's virtual visit

Sandia's first virtual visit with the secretary of energy featured presenters from key programs and facilities who shared critical work from across the Labs, thanks to detailed planning and coordination among many organizations. New functional capabilities and high standards were set for virtual and hybrid events. Secretary Jennifer Granholm and NNSA Administrator Jill Hruby commended the Labs on providing maximum engagement in a virtual setting. (ESG, 1000, 2000, 3000, 6000, 8000)

Cybersecurity preparedness

Sandia conducted its first-ever Cyber Avenger drill and workshop to strengthen preparedness and resiliency against cyberattacks and test potential impacts to critical infrastructure, such as networks, utilities and water. It was the catalyst for shared intelligence and enhanced communication, and established protocols for information-conditions levels. Sandia built collaboration between local, state and federal agencies that has improved regional emergency planning. (ESG, 4000, 5000, 8000, 9000)

Climate vulnerability assessment

To support development of the DOE Vulnerability Assessment and Resilience Plan, a team in Sandia's Environmental Stewardship program compiled data on critical assets and infrastructure that characterized climate trends and how likely they were to affect operations. Los Alamos and Lawrence Livermore national labs benchmarked the data. The plan establishes climate considerations as essential to U.S. foreign policy and national security. (ESG, 4000, 8000, LANL, LLNL)

NNSA strategic plan

Sandia was integral to NNSA's 2022 strategic planning process, which focused on developing and implementing long-term strategic priorities for the nuclear security enterprise. Labs leadership participated in a Strategic Planning Summit where NNSA's strategic vision was discussed with management and operating partners from the laboratories, plants and sites. The summit kicked off the biennial planning cycle that resulted in Sandia's formal strategic plan. (ESG, 1000, 2000, 3000, 4000, 5000, 6000, 7000, 8000, 9000, 10000)

Workplace violence prevention

To bolster its commitment to a safe work environment, Sandia gave its Workplace Violence Prevention Program a framework to identify and report violence precursors based on potential or observed behaviors. Workplace violence concerns can be reported 24/7, and a team from Emergency Management, Safeguards and Security, Cyber Security, Human Resources, Audit and Ethics, Employee Health Services and line management meets to assess threats and make decisions that protect the workforce. (ESG, 3000, 4000, 8000, 9000)

Policy changes bring retirees back

To help meet unprecedented mission needs and high attrition among long-serving employees, Legal and Prime Contract partnered with Human Resources to implement policy and pension plan changes that encourage retirees to return part-time while maintaining their pensions. (3000, 11000)

■ LEGAL

Authors earn copyright ownership

Legal Technology Transfer, with support from the Technology Partnerships Organization, created and successfully implemented a new copyright transfer program that provides Sandia authors ownership of the copyrights in their scientific and technical written works. The program streamlines the publication process and allows Sandia authors to collect royalties directly from publishers. (11000)

...and let us not seek to hide our heads in the sand, but let us face the music and the顏... bear any burden,
...and meet the highest responsibilities of an emergency with a man's heart and a woman's soul, now he survival and the success of liberty.

-JFK

