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Operational and Mission Highlights

A MONTHLY SUMMARY OF TOP ACHIEVEMENTS

October 2022

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Annual Letter Sums Up State of Four Nuclear Weapons Systems

On Sept. 26, Director Thom Mason signed the Laboratory's annual assessment of four of the weapons systems in our nation's nuclear stockpile: the B61 family of bombs and the W76, the W78 and the W88 warheads. Addressed to the secretary of energy, the secretary of defense and the chair of the Nuclear Weapons Council, this letter informs the president of the United States of our confidence that the stockpile remains safe, secure, and effective now and into the future as a result of our dedicated sustainment and modernization efforts.

In the letter, Mason said the mission-critical work performed at Los Alamos cannot be achieved anywhere else in the nation. He acknowledged the Laboratory's growing workforce and enhanced infrastructure as vital to this work.

Topics of the letter (such as warhead health and — new this year — cybersecurity) are required by 50 U.S. Code 2525. Other topics are covered at the discretion of Director Mason, with guidance from Bob Webster, deputy Laboratory director for Weapons. For example, over the years, pit production has been addressed, and this year's pit production discussion benefited from the involvement of new Associate Laboratory Director Mark Anthony of Plutonium Infrastructure and new Associate Laboratory Director John Benner of Weapons Production.

Authorization to Operate Issued for the Plutonium Facility's Chlorine Delivery and Detection System

On October 11, 2022, the TA-55 Facilities Operations Director issued an Authorization to Operate for the chlorine delivery and detection system installed at the plutonium facility. This new equipment—an essential piece of the 30-pits-per-year mission—will improve plutonium metal quality and reduce waste, thereby increasing the effectiveness of plutonium recovery.

This authorization sets the stage for the system to become operational in the first quarter of FY23. The milestone is a result of a nine-year long collaboration between Plutonium Infrastructure and the following organizations: Weapons Production (including Pit Technologies and Process Maintenance and Decontamination Services [PMDS]), Capital Projects, Facilities & Operations (Safety Basis), and Environment, Safety,

Health, Quality, Safeguards, and Security (Radiation Protection).

Op-Ed in Federal Times Highlights How the End of Testing Ushered in a New Era of Supercomputing

An op-ed by Bob Webster (Deputy Laboratory Director for Weapons) and Nancy Jo Nicholas (Associate Laboratory Director for Global Security) in the *Federal Times* explains how the U.S. moratorium on nuclear testing brought with it an unexpected benefit that few are aware of: ushering in a revolution in high-performance computing that has wide-ranging impacts on national and global security.

Webster and Nicholas write how, 30 years ago, on September 23, 1992, the United States conducted its 1,054th nuclear weapons test. When that test, named Divider, was detonated in the morning hours underground in the Nevada desert, no one knew it would be the last U.S. test for at least the next three decades. But by 1992, the Soviet Union had formally dissolved, and the United States government issued what was then seen as a short-term moratorium on testing that continues today.

Since then, LANL has used advanced computer modeling and simulations coupled with nonnuclear and sub-critical experiments to maintain and verify the safety and reliability of the nuclear stockpile. But the geopolitical landscape has changed in recent years, and while nuclear threats still loom, a host of other emerging crises threaten our national security: pandemics, rising sea levels and eroding coastlines, natural disasters, cyberattacks, the spread of disinformation, and energy shortages. The supercomputing advances that have been developed over the decades to simulate nuclear weapons' explosions at extraordinarily high fidelity are now being used to address these threats as well.

Nuclear Criticality Safety Program Achieves Nuclear Safety Milestone

Staff from the Nuclear Criticality Safety Program (NCS) achieved an important milestone six years in the making. In 2016, the Laboratory had 315 pending fissionable material operations (FMOs) requiring compliant critical safety evaluation documents (CSEDs). As of October 2022, that number has dropped to six remaining FMOs, all of which are expected to be completed by the end of the year. The reduction was made possible

by the focus and effort of facility, operations, and NCS staff to complete 275 CSEDs. This accomplishment marks a significant step in the NCS program improvement plan, which was implemented in partnership with the NNSA Los Alamos Field Office and the Defense Nuclear Facilities Safety Board (DNFSB).

Pit Technologies Division Builds Most Development Pits in 13 Years, Other Accomplishments

The Pit Technologies (PT) Division has wrapped up its most successful fiscal year in more than a decade. PT built seven pits, the most pits built at the Laboratory since 2009.

The year also brought other notable accomplishments:

- Additional characterization steps and methods, such as additional computed tomography steps, were introduced; residual gas analysis was introduced; side tube gas sampling equipment was upgraded; welding parameters were improved; and rapid modification of non-nuclear hardware was achieved.
- Sixty-one electrorefining runs were completed, which is the highest number of runs since 1990.
- The Foundry group overcame a number of equipment and technical challenges to produce castings at a rate not seen in more than 10 years; 33 shape castings were produced to support multiple programs.
- All required engineering evaluations (EEs) for chemistry and radiography processes supporting the first production unit were completed. Four qualified engineering releases have been completed. More than 19 EEs have been conducted and are in the closeout phase.
- Assembly Operations and the Associate Laboratory Directorate for Plutonium Infrastructure successfully installed a robotic arm in a glovebox. This represents the first time PT will use automation for plutonium processing.
- The metal production group completed the management self-assessment for the chlorine system, allowing operations to begin in the first quarter of FY23. Completion of this multi-year effort is expected to reduce waste and improve plutonium metal quality.

Weapons Production, Plutonium Infrastructure Complete Critical Materials Transfer in Record Time

On October 11, 2022, workers from Operational Readiness Implementation (Weapons Production Directorate) and Plutonium Infrastructure (ALDPI) quickly and safely moved a shielding door from reception to fabrication. The door is required to support a hot press installation project for the Actinide Material Processing & Power Division—critical to NASA and defense power source missions for the Laboratory—and will be used to protect workers from exposure to heat source plutonium.

The team coordinated with the vendor, warehouse staff, and craft from the Logistics Division to receive, inspect, transport to the shop bay, and initiate fabrication in just two hours; typically, it takes three to twelve working days for the warehouse to receive, inspect and release material to a customer. The expedited receiving process will help complete the Hot Press 4 project, which is tasked with making heat source plutonium pellets for NASA. These pellets are used to power their Curiosity and Perseverance Mars rovers, as well as the upcoming Dragonfly mission which will explore Titan, a moon of Saturn.

SCIENCE, TECHNOLOGY, AND ENGINEERING

New Effort Underway to Help Revolutionize Future of Vaccine Development

A new multi-laboratory consortium, led by LANL and funded by the Defense Threat Reduction Agency, is working to create a machine-learning tool to revolutionize the future of vaccine development. The goal is to enable vaccine developers to rapidly choose a suitable vaccine platform for any viral or bacterial pathogen.

Vaccine design, testing, and manufacturing are time-consuming and expensive, with the development of a single vaccine costing up to \$68 million and failure rates as high as 94 percent. Vaccine development typically starts with multiple candidates following a lengthy linear workflow to mitigate these costs and risk. Each vaccine platform generates a defined immune response based on its mechanism of presenting antigens to the host; similarly, the host immune system is required to generate a distinct immune response

to survive an infection by a pathogen. The new machine-learning tool, called the Rapid Assessment of Platform Technologies to Expedite Response (RAPTER), will predict the most suitable vaccine technologies for a given pathogen to increase the rate of success and reduce the number of initial vaccine candidates required.

The team will apply computational modeling and broad text-mining techniques to normalize and draw conclusions from a variety of data sources and identify an immunological profile for each vaccine platform and entire classes of pathogens. Targeted experiments with standardized protocols will be performed to fill data gaps, ensuring a direct comparison of seven vaccine platform technologies while also validating the accuracy of the machine-learning tool predictions.

The organizations in the new consortium are Los Alamos National Laboratory, Pacific Northwest National Laboratory, Lawrence Livermore National Laboratory, Sandia National Laboratories, U.S. Army Medical Research Institute of Infectious Diseases, Harvard University, Northern Arizona University, Tulane University, University of California San Diego, University of New Mexico, and University of Nevada at Reno. The funding for the project will cover four years of research.

New Experiment Sent to the International Space Station to Study How Microgravity Reveals Hidden Microbes

A LANL-led experiment on board the Space X Crew 5 rocket that launched in early October aims to help explain how the human gut's microbiome changes while astronauts are in space, and thereby better prepare humans to stay healthy during space travel. The experiment is the second of its kind in a study of how microgravity affects the human microbiome.

The results of the researchers' first experiment, sent to the International Space Station in March 2020, showed that some bacteria thrive and grow in microgravity conditions, while others are depleted. Preliminary evidence suggests that some of the bacteria that thrive are potentially pathogenic and others are potentially beneficial. Additionally, some of the space-traveled bacteria discovered are unknown and unidentified—these species are always present in the human gut but only "show themselves" by successfully growing in a microgravity environment.

Pinpointing any pathogenic bacteria that might emerge when people are in space allows scientists to identify potential appropriate therapeutics. Furthermore, if some beneficial bacteria thrive, these too could be used to promote astronaut health and well-being.

Three Laboratory Scientists Elected 2022 American Physical Society Fellows

The following three Laboratory scientists have been elected Fellows by the American Physical Society (APS): Mary Hockaday, Nicole Lloyd-Ronning, and Rolando Somma.

The APS fellowship program recognizes APS members who have either made advances in physics through original research and publication or made significant innovative contributions in the application of physics to science and technology. Such members may also have made significant contributions to the teaching of physics or service and participation in the activities of the APS.

Hockaday was named a Fellow for essential contributions to national security science and international scientific collaboration, for leadership in fostering dialogue among diverse technical and policy communities, and for promoting equity and inclusion, especially for women in physics. She has led the Laboratory's Nuclear and Engineering and Nonproliferation Division since 2018.

Lloyd-Ronning was selected as an APS Fellow for the development and work on a broad set of outreach programs introducing STEM science to students from elementary to undergraduate schools, and for tireless efforts to affect institutional change, working toward a more inclusive, diverse and equitable STEM work environment. She is currently an astrophysicist in the Computational Physics and Methods group (CCS-2).

Somma was selected for outstanding theoretical contributions to quantum computing, in particular the development of quantum algorithms for quantum simulation. He was a technical staff member in the Physics of Condensed Matter and Complex Systems group (T-4) until joining Google as a research scientist this fall.

Using AI to Predict Fault Slip in Laboratory Earthquake Machines

Geophysicists at Los Alamos National Laboratory have harnessed an artificial-intelligence (AI) approach to predict the future friction of a fault in a laboratory earthquake machine, advancing their previous breakthrough work in earthquake forecasting. The technique provides a potential path to near-term forecasting of earthquake timing in Earth.

The AI approach is analogous to writing an email in English and having the AI translate it to Japanese while autofilling the end of the sentence. Applying AI to seismic signals from the lab quake machine reveals that they contain foreshadowing information about the future fundamental physics of the system through the entire earthquake cycle and beyond. Thus, the AI can predict the future time of the next failure of the fault with high resolution, along with the fault's future physical state.

The next challenge is whether the team can predict future fault displacement in Earth. This question remains open because long data sets for real-world faults do not exist for training the AI model as they do for laboratory quakes. The method could also be applied to other disciplines, such as nondestructive materials testing, where AI could provide information about impending damage to, say, a bridge.

MISSION OPERATIONS

2021 Annual Site Environmental Report Shows Improvement in Waste Reduction

The Laboratory's Annual Site Environmental Report (ASER) for calendar year 2021 demonstrates LANL's ongoing commitment to meeting regulatory requirements for protecting the environment of Northern New Mexico.

The 350-page report characterizes the Laboratory's environmental performance, including effluent releases, environmental monitoring, and estimated radiological doses to the public and the environment. In 2021, radiological doses to the public from Laboratory operations were less than 1 millirem per year, posing no discernable health risk.

The Laboratory continues to be in compliance with 18 different environmental permits and legal orders gov-

erning its operations. ASER, which was issued publicly on September 30, showed a marked improvement in the management of mixed wastes under the Laboratory's Site Treatment Plan. Mixed low-level waste volume was reduced by 85 cubic yards and transuranic mixed waste decreased by 96 cubic yards. During 2021, the Laboratory continued to be in compliance with its Clear Air Act, Title V operating permit emission limits.

HOLA ERG Celebrates Diversity in Their Heritage, Hosts Events in Recognition of Hispanic Heritage Month

HOLA, the Lab's Hispanic Opportunities of Los Alamos Employee Resource Group (ERG), celebrated National Hispanic Heritage Month (Sept. 15–Oct. 15). HOLA's theme this year was diversity within the Hispanic community, which is also represented in the group. HOLA hosted several events, including live musical performances, talks, a Spanglish 101 presentation, and food gatherings. Each of the events was well attended and HOLA received positive feedback.

Hispanic Heritage Month and the HOLA ERG were promoted internally via LANLToday and LANLInside, and externally via the Lab's social media networks, which resulted in about 10,000 impressions.

Lab Completes Climate Change Vulnerability Assessment and Resilience Plan

LANL has completed its first assessment of potential climate change-related hazards and threats to Lab assets and facilities. The climate change vulnerability assessment and resilience plan (VARP) was a multi-organizational effort developed in response to DOE's request for such a plan from all DOE sites.

The objective of the VARP is to help the Lab identify, prepare for, and meet challenges posed by climate change, and consists of two parts: (1) the vulnerability assessment identifies both mission-critical assets and climate change hazards likely to impact the site (e.g., wildfire, drought, and wind), and includes a risk matrix showing the relationships between critical assets and climate change hazards, thereby exposing vulnerabilities; and (2) resilience planning, identifies and assesses potential resilience solutions and recommends mitigation

tion strategies to address previously identified vulnerabilities.

The VARP team recommended nineteen projects for LANL to implement to improve resilience to the impacts of climate change. A few examples of these resilience solution projects are the installation of an onsite 10 megawatt (MW) photovoltaic solar array to improve electricity availability, addition of a heat recovery steam generator to supply steam heat to TA-03, and an increase in forest thinning and masticating practices to reduce the risk of extreme wildfires.

Laboratory Achieves Near-Perfect Score for Property Inventory

The Laboratory's Logistics Property Management group completed a required wall-to-wall property inventory of approximately 65,000 Lab-issued accountable property items, as well as a 100 percent precious metals inventory validation for FY22 resulting in the performance score of "outstanding" from NNSA. The score demonstrates disciplined operations: 99 percent accountable property items and 100 percent high-risk and sensitive property items were located. To validate the inventory, NNSA performed an onsite property system review that resulted in positive feedback, no identified deficiencies, and approval of LANL's Property Management System for the next three years.

Laboratory Completes Venting and Handling Demonstrations of Flanged Tritium Waste Containers for Federal Readiness Assessment

In early September 2022, a Federal Readiness Assessment (FRA) team observed Laboratory workers conducting venting and handling proficiency demonstrations of flanged tritium waste containers (FTWCs) at Technical Area 49.

Because more than a year had passed since completion of the previous FRA of the FTWC venting operation, the FRA team recommended that if FTWC venting and handling operations are not completed within this calendar year, the Laboratory should successfully demonstrate performance to the members of the FRA team before beginning operations.

No findings were identified in the FRA's surveillance reports; however, follow-up actions include a revision to the venting and handling procedure.

The FRA was a key step in the ongoing readiness review process for the proposed headspace gas venting of four FTWCs stored at Technical Area 54. NNSA is awaiting approval of follow-on administrative actions and the final approvals from the Department of Energy's Office of Environmental Management and the New Mexico Environment Department. Venting will not take place until all formal readiness processes are complete.

More than 500 Square Feet of New Space Made Available in Plutonium Facility Through Secure Disposition of 800 Classified Parts

The Weapons Dismantlement and Disposition program completed the disposition of more than 800 Beryllium classified parts, leaving 522 square feet of classified vault space in the Plutonium Facility (PF-4) available for the pit production mission's use. The parts, which had been stored in PF-4 since they arrived from Rocky Flats in the 1990s, were transported out of TA-55 for either permanent disposal or to be recycled and reused. For example, the SIGMA Beryllium Test Facility will use 200 parts for welding and research. The dispositioning work took place between April and the end of FY22. Employees from Operational Readiness Implementation, Experimental Device Engineering & Assembly, Sigma Division, and Weapons Modernization Production were all crucial in accomplishing this level 2 milestone.

New Badge Office in Downtown Los Alamos Open for Service

On September 29, LANL Badge Office employees were joined by Lab and NNSA leadership to celebrate the grand opening of a new location in downtown Los Alamos. The new office is expected to ease traffic and improve security by reducing the number of non-badge holders entering Laboratory property through the vehicle access portals. An additional benefit of the new location is an improved customer experience.

The two existing onsite badge offices will continue to operate as before. The office in the core area of campus will be reconfigured and scaled down to include four badging stations; no changes will be made to the office in the plutonium production area of campus.

Having one main office and two satellite offices should alleviate the wait times for visitors and customers. In addition to the lasting benefits of improved traffic flow at the entrances to the Lab and greater onsite securi-

ty, new hires and visitors will get newly issued badges or enroll their existing HSPD-12 credential at a newer facility at an offsite location with plenty of parking.

New Mexico's Finance Committee Visits Lab, Hears from Top Leaders and Scientists

The State of New Mexico's Legislative Finance Committee (LFC) took in a full day of on-site activities on October 17 to learn more about the Laboratory's mission, programs, and impact on the region. The 17-member body provides the state's legislature with objective fiscal and public policy analyses, recommendations, and oversight of state agencies to improve performance and ensure accountability.

The LFC met with Laboratory leadership and science experts, including Director Thom Mason, National Nuclear Security Administration Los Alamos Field Office Manager Ted Wyka, Staff Director Frances Chadwick, and Deputy Laboratory Director for Science, Technology and Engineering John Sarrao. Topics of discussion ranged from Mars exploration to the six state Intermountain West Energy Sustainability & Transitions coalition (I-WEST). Representative Patricia Lundstrom, chair of the LFC, who has publicly supported hydrogen development in New Mexico, noted her appreciation for the Laboratory's "well-rounded perspective" on energy transition as part of I-WEST, including its consideration of local and regional economies and ways of life, particularly in tribal areas.

The group took in several interactive presentations from Laboratory scientists, including a demonstration of the Los Alamos-honed FIRETEC program used to predict impacts of prescribed forest fires under varying atmospheric conditions. The program and its modeling capabilities have taken on new significance in the wake of the recent Calf Canyon/Hermits Peak wildfire -- the largest in state history.

New Procedure Strengthens Lab's Reviews and Security

The Operations Security program has released a new procedure—Identifying Critical Information and Performing Pre-Publication Reviews (OPSEC-012)—that will help protect government information, which is foundational to working securely at the Lab.

Employees are expected to use this self-review procedure, available on the opsec.lanl.gov webpage, in con-

junction with the Laboratory's formal review system to ensure that unclassified published materials are free of sensitive information.

All Lab workers have an obligation to review all material for critical information before it is published (i.e., before it leaves exclusive control of the Laboratory and its authorized partners). This requirement is contained in SD200 Integrated Safeguards and Security Management and flows down from both DOE and NNSA directives.

Ombuds Office Hosts First Southwest Ombuds Symposium

The Laboratory's Ombuds Office hosted the first Southwest Ombuds Symposium on August 25 and 26, bringing together 19 attendees from across New Mexico, Arizona, and Colorado.

Ethics and Audit Division Director Rachel Schroeder kicked off the first day of the event at the Dorothy McKibbin Conference Center in Santa Fe. Chief Justice Emeritus of the Navajo Nation Robert Yazzie, the featured speaker, discussed the Navajo tradition of peacekeeping.

Attendees also shared similarities and differences in how they do their work and discussed common challenges and best approaches to the work of ombuds.

The second day of the symposium took place at the Lab's Bradbury Science Museum. Attendees explored Los Alamos history and learned about the Lab's Ombuds Office, which was created in 1996 under the guidance of then-Lab Director Sig Hecker. Nic Lewis, a Lab historian, discussed the creation of the Laboratory and the juxtaposition of its conflict resolution work while maintaining a nuclear stockpile to deter global threats.

In addition to the Lab's ombuds, attendees included ombuds from Sandia National Laboratories; Mars, Inc.; FEMA; Northern Arizona State University; University of Colorado, Boulder; University of Colorado, Denver; the Arizona Department of Corrections; and the Commercial Association of Realtors.

PF-4 Pump Room Cleaned Out to Make Way for Engineered Controls, Safety Basis

TA-55 teams succeeded in removing four drums of used personal protective equipment, tools, and oth-

er waste from a pump room in the Plutonium Facility (PF-4) the week of October 17 as part of a maintenance project in support of the Lab's plutonium missions. This was a multi-team effort spanning months of preparation and planning, and culminating in a long hot job, or job working with radioactive material. The pump room services the plutonium-238 wet vacuum system, which is used to transfer plutonium-238-rich solutions to glovebox lines for processing. Removal of any remaining contaminated material was needed prior to performing pump room maintenance and installation.

Teams from across Actinide Materials Processing & Power, Nuclear Process Infrastructure, Radiation Protection, and more were key to this achievement, providing planning and scheduling, knowledge sharing from previous jobs, coordination, and administrative support. This is a significant step to restore wet-vacuum services, which will enable improved processing capabilities across several programs. Teams in PF-4 are now positioned to create specific plans for unique waste items remaining and plan next steps for the pump room to be in accordance with TA-55 safety basis and sustainable disciplined operations.

Plutonium Infrastructure Recruits at Fall Career Fairs, Reports FY21–22 Hiring Statistics

The Construction Projects Strategy (CPS) team within the Associate Laboratory Directorate for Plutonium Infrastructure (ALDPI) has been actively recruiting to fill positions for PI as well as for partner organizations including Plutonium Infrastructure Engineering; Infrastructure and Capital Projects; Facilities and Operations; Weapons Production; and Environment, Safety, Health, Quality, Safeguards, and Security.

Throughout September, the CPS team attended in-person and online career fairs, including the Corporate Gray Veterans Career Fair and events at the University of Texas at Austin and University of Illinois Urbana-Champaign. The team reported strong turnouts at all events, receiving more than 200 resumes in the month of September.

Using the Laboratory's brand and various advertising tactics to target desired skillsets, the CPS team aims to fill a variety of positions for PI and its partner ALDs. The positions include engineers, project controls, project managers/specialists, radiation control technicians, industrial hygienists, and craft workers. The CPS team

has been actively collaborating with partner ALDs and other Laboratory organizations including Human Resources (Talent Acquisition) and the Partnerships and Pipeline Office on recruiting and marketing efforts that supplement current recruiting initiatives.

Since PI's launch in June 2021, the organization has rapidly grown from a staff of 346 full-time equivalent (FTE) employees at the end of FY21 to nearly 900 FTE staffers at the end of FY22, achieving over 95 percent of the FY22 staffing goal. This rate of hiring is expected to continue over the next few years. By 2024, ALDPI will nearly double in size to more than 1,500 staffers supporting the mission.

Plutonium Infrastructure Team Prepares for Glovebox Transfers Using Video Simulations

On Oct. 6, the Plutonium Infrastructure (ALDPI) Facility Interface group unveiled several video simulations supporting both the removal of legacy gloveboxes and the introduction of newly fabricated gloveboxes into the Plutonium Facility (PF-4). Developing and reviewing simulations will help workers ensure no major constraints or obstacles restrict the safe handling, movement, and staging of glovebox enclosures. These simulations are instrumental to the planning stages of intricate field execution activities such as glovebox removal in support of the Laboratory's 10-pits-per-year and 30-pits-per-year missions.

The group's efforts exemplify effective planning, coordination, teamwork and conduct of operations and are paramount for safe and efficient transport of equipment. Later this fall, the group will prepare a simulation of the entire evolution for the relocation of a new glovebox currently undergoing pre-installation and fabrication by the ALDPI Equipment Integration execution arm at the TA-46 warehouse workspace.

Safety Observations Give Insight into Vehicle Risks, Injury Prevention

Two recent efforts by Facilities and Operations (ALDFO) to observe driver behaviors captured important trends involving government vehicles (GOV) and privately owned vehicles. The results of these efforts will improve safety at the Lab.

In August, Craft Safety Advocates monitored common driving areas at the Laboratory and observed between 30–70% of GOV drivers were not wearing seatbelts. All drivers in the area were observed, but this initiative focused on craft workers, who contributed 1.73 million miles out of the 3.4 million total miles driven with GOV vehicles in fiscal year 2021. As a result of the initiative, the safety team performed an exercise with drivers, giving drivers a strong reminder of the requirements for driving a GOV vehicle.

Similarly, the Institutional Worker Environmental, Safety and Security Team conducted a series of management observation and verifications (MOVs) at six locations. During the observations, repeated hazards were drivers on their cell phones and occupants not wearing seat belts, among others. The complete list of observations and actions will be compiled once the MOV series is complete. Additional observations are planned in October.

Scrap Declaration Agreement Moves Forward with Highly Enriched Uranium Oxide Shipment

In mid-September, the Actinide Materials Processing & Power Division's uranium electrolytic decontamination team together with the Nuclear Process Infrastructure Division's transuranic waste shipping group successfully completed a highly enriched uranium (HEU) oxide shipment as part of the Department of Energy's scrap declaration agreement, which was established in February 2020. Renewing the capability to ship HEU material to various locations was no easy feat, each location having their own safety basis and requirements. As the team encountered obstacles, they generated new ideas and gained different perspectives on the requirements by working with other facilities to aid in finding solutions. The team put in extensive hours of research and work to ensure this shipping capability was re-established and to ensure the capability is reliable to meet future needs. This scrap declaration capability is a major component of LANL's Material Recovery and Recycle mission to disposition surplus nuclear components and improve the vault storage capability for pit production. This is an ongoing mission for the Laboratory that is transitioning to the Advanced Recovery and Integrated Extraction System program to meet continued support of vault availability.

SERF Upgrade Increases Availability, Brings Reliability to Supercomputing Operations

The Sanitary Effluent Reclamation Facility (SERF) collects treated wastewater—water that is already suitable for discharge—from the Laboratory and further purifies it for reuse in operations to support our mission rather than immediately discharging it into the environment. Starting in July, the Strategic Computing Complex (SCC) supply system was taken offline to remove primary and secondary forwarding pumps and install one set of larger pumps, which negate the need for a secondary set, and a backup generator for the pump system. The newly installed pump system provides full flow to the SCC from SERF, enabling backup power of the system via an automatic transfer switch and generator in the event of power glitches or outages. The project was completed and commissioned two weeks ahead of schedule, increasing SERF availability to nearly a hundred percent at the SCC. The result is around-the-clock reliability at SERF in support of the 24/7 supercomputer operations.

Tycho, First Phase of New Supercomputer Has Arrived at LANL

The successful installation of Tycho—the critical first phase of Los Alamos National Laboratory's newest supercomputer, Crossroads—has just been completed. This advanced technology system is funded by NN-NSA's Advanced Simulation and Computing program to support critical maintenance and modernization of the U.S. nuclear stockpile, as well as other nuclear security missions, and is expected to be operational for classified work by year's end.

A Hewlett Packard Enterprise machine, Crossroads will replace Trinity as the Lab's primary supercomputer in the coming year and will support next-generation weapons simulations.

Early benchmarks indicate a fourfold increase in speed over Trinity. New efficiencies that are part of Tycho, and ultimately Crossroads, are coming together to reduce crucial time to insight through modeling and simulation.

Tycho brings to bear emerging technologies including the first large-scale deployment of Intel's new Sapphire Rapids processor. Earlier this year, High Performance

Computing tests helped Intel engineers configure the chip to best serve Lab-specific application performance.

Adding to overall efficiency, solid-state drives will make up the entirety of Tycho's file system—a first for LANL supercomputers. Additionally, warm-water direct liquid cooling will mean significant energy savings over more traditional approaches.

In the coming months, the Crossroads team will work to stabilize Tycho, calibrating the system's 2,600 Sapphire Rapids nodes for maximum efficiency. Software will be installed and functionality testing will take place to ensure Tycho's early use in the classified environment by the end of the year and full production status in March 2023.

Weapons Production Leadership Kicks Off Professional Development Programs for Managers

In early October, training teams in Weapons Production (ALDWP) hosted two workshops to improve management performance and employee experience. On Oct. 4, 18 first line managers attended their first of seven monthly modules led by ALDWP's training group and senior leaders. On Oct. 6, a different group of 22 managers participated in an externally-hosted Conversational Capacity Workshop—an all-day pilot session to promote management development within the directorate. Additionally, on October 12, the emerging leaders program was launched for 20 nominated staff. The cohort began a 10-week Succession to Equip Potential (STEP) Leaders Program to better prepare them for management and formal leadership roles.

These are part of the many workforce development initiatives promoted through the newly-formed Continuing Training/Education and Workforce Development Team, and supported by managers within the directorate.

Welding of Heat Source Final Assemblies Exceeds Expectations

In FY22, teams in the Actinide Materials Processing & Power (AMPP) Division completed welding on 169 heat source final assembly (HSFA) clads. Producing heat sources from plutonium-238 is considered an essential mission for national security. The program includes

operations to purify, process, and weld Pu-238 oxide into encapsulated heat sources for space and defense missions. The team's goal for the fiscal year was to weld 162 HSFA clads; they achieved that, plus welded seven more. In addition to the welding successes, 48 clads were diamond stamped in FY22, 59 clads were complete through all inspections within FY22 and ready for diamond stamping, and 62 clads will be leak tested and through all inspections ready for diamond stamping in mid-October.

COMMUNITY RELATIONS

Laboratory Engages Local Communities to Complete Key Sample Collection

The Laboratory's Soil, Foodstuffs, and Biota program recently completed its triennial collection of foodstuffs samples from surrounding communities. The program collects these samples to determine if Lab operations are affecting chemical concentrations in different parts of the environment, including in soil, foodstuffs, plants, and animals, and to determine the impacts of these concentrations on human and environmental health.

Over 80 foodstuffs samples, including from domestic crops and animal products, were collected between June and October 2022 and are now being analyzed for the presence of radionuclides, metals, and/or organic chemicals, such as PCBs (polychlorinated biphenyls) and PFAS (per- and poly-fluoroalkyl substances).

Results from the 2022 sample collection will be available in the months ahead and documented in the 2023 Annual Site Environmental Report (ASER). Previous results indicate that concentrations of monitored constituents fall within Department of Energy and Food and Drug Administration standards and are safe for human consumption. The recently released 2021 ASER captures the results of the program's ongoing soil and biota sample collections.

NNSA and Laboratory Make 350 Cords of Wood Available to Pueblo Neighbors

Tribal members from the Accord Pueblos of San Ildefonso, Santa Clara, Cochiti and Jemez picked up 350 cords of free firewood derived from forest-fire mitigation efforts conducted on Laboratory property over the past year. This is the fourth year the National Nuclear

Security Administration (NNSA) has made the excess wood available as part of a larger effort to improve forest health on Laboratory property while serving local communities. Since the Cerro Grande fire in 2000, the Lab has been thinning trees to reduce fuel loads and the threat of wildfire. Such efforts helped curtail the spread of the Cerro Pelado fire that threatened the Laboratory and the Los Alamos town site in May of this year.

Viramontes Helps Honor Emerging Community and Business Leaders at Santa Fe Hispanic Chamber of Commerce Awards Event

Associate Laboratory Director for the Defense Protection Program Unica Viramontes gave the keynote speech on September 30 as the Santa Fe Hispanic Chamber of Commerce celebrated its inaugural "40 Under 40" awards event, recognizing emerging community and business leaders in Northern New Mexico.

Viramontes congratulated all the honorees, including the Laboratory's own Ryan Hook from Finance division. Viramontes informed the audience that nearly 40% of the Laboratory workforce is Hispanic and that the Lab has received recognition as a top employer from magazines including Hispanic Network, Latina STYLE, STEM Workforce Diversity, and Minority Engineer.

Viromontes then shared her own journey that began at a local, predominantly Hispanic high school. She then went on to the University of California, Berkeley but returned to start her career at the Laboratory where she now holds a senior management position in a male-dominated field. Her story illustrates the opportunities the Laboratory provides for local minorities to find rewarding and well-paying careers that allow them to stay in their communities and help build local economies.

SELECTED MEDIA COVERAGE

[Cathy Plesko describes her role in NASA's DART mission](#)

KKOB 96.3 FM, Joe Diaz (9/27)

Principal Investigator for Planetary Defense from Los Alamos National Laboratories talks about DART (Double Asteroid Redirection Test) on News Radio KKOB.

[Spot robots make appearance in Ohkay Owingeh during LANL community event](#)

Los Alamos Reporter, Maire O'Neill, (9/28)

At last Wednesday's event, the big hit was bright yellow Spot robots acquired by LANL in the past year to determine their suitability to supporting staff with tasks that are potentially risky or require precision detection.

[Assessing the damage, New Mexico labs leading research on abandoned oil and gas wells](#)

Carlsbad Current Argus, Adrian Hedden (9/29)

Researchers at New Mexico's two national Laboratories are working to identify and study abandoned oil and gas wells throughout the state, aiming to devise the full environmental impact of the wells and the cost of cleanup.

[Discovery of 'fingerprint' confirms alarming predictions of Greenland ice sheet melt](#)

NBC News, Sarah Sloat (9/29)

Researchers announced Thursday that they had detected the sea level "fingerprint" of the Greenland ice sheet melt, pinpointing the unique pattern of sea level change linked to the melting ice.

[Can these government efforts crack the code for DNA storage?](#)

PopSci, Sarah Scoles (9/30)

The intelligence community is funding research into storing our ever-expanding troves of data in DNA. Their efforts could change how everything from our photos to Google searches get saved.

[LANL: Raised on New Mexico ranch, teamwork still a priority for LANL's Loretta Ortega](#)

Los Alamos Reporter (9/30)

Ortega has used the strong work ethic she developed working on the family ranch to advance her career. Her colleagues recognize her ability to carve out a different career path by using her determination and initiative.

[University Of California Regents commit \\$500,000 for planning of offsite childcare facility for LANL employees](#)

Los Alamos Reporter, Maire O'Neill (10/3)

A Triad National Security parent organization, the University of California, has committed \$500,000 in initial funding for the planning of a potential off-site childcare facility in Los Alamos for Los Alamos National Laboratory employees and a possible location has been identified near the Lab.

[DOE/NNSA clears path for microwave dishes in Santa Fe and at LANL for communications infrastructure](#)

Los Alamos Reporter (10/5)

The U.S. Department of Energy/National Nuclear Security Administration proposes to install two eight-foot-wide microwave dishes and accompanying infrastructure on the roof of a leased property in Santa Fe, NM.

[LANL: Microgravity in space reveals hidden microbes — experiment to be launched into space today](#)

Los Alamos Reporter (10/5)

A mission on board the Space X Crew 5 rocket is aimed at helping explain how the human gut's microbiome changes while astronauts are in space.

[New approach improves identification of natural-gas emitters](#)

Phys.org (10/5)

A new study in New Mexico's San Juan Basin will boost efforts to identify and reduce methane emissions, a key element of the Global Methane Pledge. The research team found that using multiple methods to measure the ratio of ethane to methane in the ambient air around fossil energy development regions can be used to attribute emissions to specific polluters.

[New research from LANL creates a predictive model for drug design by combining quantum physics, chemistry, and machine learning](#)

Inside Quantum Technology, Kenna Hughes-Castleberry (10/7)

Thanks to the benefits of machine learning, researchers can study more complicated scenarios in simulations, including those focused on quantum physics and chemistry.

[LANL pair want to tap into science for better beer](#)

Santa Fe New Mexican, Scott Wyland (10/8)

Acoustic scientists at Los Alamos National Laboratory are developing technology to sonically monitor beer as it's made, offering brewmasters a tool beyond their five senses to ensure each batch is consistent and of the highest quality.

[How to determine coal mines' methane emissions](#)

Mining.com (10/9)

A research team at Los Alamos National Laboratory found that using multiple methods to measure the ratio of ethane to methane in the ambient air around fossil energy development regions can be used to attribute emissions to specific polluters.

[LANL celebrates National Hydrogen and Fuel Cell Week 2022](#)

Los Alamos Reporter (10/9)

In celebration of National Hydrogen and Fuel Cell Week, Los Alamos National Laboratory joins scientists and engineers across the country to commemorate and raise awareness of hydrogen innovations and the role they play in a cleaner and more equitable energy future.

[AI predicts physics of future fault slip in laboratory earthquakes](#)

Phys.org (10/10)

An artificial intelligence approach borrowed from natural language processing—much like language translation and autofill for text on your smart phone—can predict future fault friction and the next failure time with high resolution in laboratory earthquakes.

[Climate change threatens supercomputers](#)

Science, Jacklin Kwan (10/11)

Increasingly intense heat waves, wildfires, and droughts are forcing costly adaptations. Managers at high-performance computing (HPC) facilities are waking up to the costly effects of climate change and the wildfires and storms it is intensifying.

[LANL scientists celebrate success of NASA's 'DART' mission](#)

KOB4, Spencer Schacht (10/12)

NASA celebrates the success of the "DART" mission, where they used a small spacecraft to hit an asteroid and throw it off course.

[Using photochemistry to separate plutonium and uranium](#)

Phys.org, Bob Yirka (10/12)

A team of researchers at Los Alamos National Laboratory has developed a way to use photochemistry to separate plutonium and uranium—work that could make it easier to store nuclear waste.

[Fighting Cancer on Earth and in Space Using High-Energy Protons](#)

Energy.gov (10/13)

Scientists on Earth use high-energy protons to create isotopes to detect and treat cancer. In space, however, these same high-energy protons can pose a risk to spacecraft and the health of the astronauts traveling in them.

[Researchers Achieve Key Step in Distinguishing Between Coal and Natural Gas Emissions](#)

Natural Gas Intel, Morgan Evans (10/13)

Researchers from Los Alamos National Laboratory were able to identify and measure the ratio of ethane to methane from different polluters, which the laboratory said could bolster efforts in achieving the Global Methane Pledge.

[Bright, powerful burst of gamma rays detected by multiple telescopes](#)

CNN, Ashley Strickland, (10/17)

Multiple space and ground-based telescopes witnessed one of the brightest explosions in space when it reached Earth on October 9. The burst may be one of the most powerful ever recorded by telescopes.

[ASU math alumna models high-velocity impact for NASA's DART mission](#)

ASU News, Rhonda Olson (10/18)

Wendy Caldwell is a scientist at Los Alamos National Laboratory and a member of DART's Impact Modelers Working Group. She earned her PhD in applied mathematics from Arizona State University's School of Mathematical and Statistical Sciences in 2019.

[Mad-Scientist Mayhem Returns With High Tech Halloween At Bradbury Science Museum Oct. 28](#)

Los Alamos Daily Post , Carol A. Clarke (10/18)

Volunteers from Los Alamos National Laboratory unveil their high-tech high-jinks at the first in-person High Tech Halloween in two years, 4-6 p.m., Friday, Oct. 28, when the Lab's Bradbury Science Museum joins forces with Los Alamos Mainstreet for hands-on science demonstrations and Trick-or-Treat on MainStreet.

[Steve Coleman Named LANL Associate Director For Environment, Safety, Health And Quality](#)

Los Alamos Reporter (10/18)

Steven Coleman has been selected as Los Alamos National Laboratory's Associate Laboratory Director for Environment, Safety, Health and Quality (ESH&Q). He will be responsible for the leadership, management, oversight, strategic planning and execution of the Laboratory's ESH&Q portfolio.

[LANL using sound waves to improve beer brewing process](#)

KRQE, Jordan Honeycutt (10/19)

Los Alamos National Laboratory scientists are behind all kinds of experiments and inventions and now they've come up with a way to use sound waves to help brew beer.

[This is not your grandparents' power grid](#)

Santa Fe New Mexican, Carleton Coffrin and Hassan Hijazi (10/23)

As extreme weather events become more frequent, these tests to the grid will continue. But the good news is that advanced mathematics, physics, and computer science solutions are increasingly ready to help operate the grid and allow for the design of safer, more reliable systems.

[LANL scientists developing improved methane detection](#)

Santa Fe New Mexican, Scott Wyland (10/23)

For a decade, researchers at Los Alamos National Laboratory have studied the natural gas concentrations at the San Juan Basin hot spot with the aim of pinpointing the specific source of a leak amid an array of plumes.

[Nine Los Alamos Researchers Named 2022 Laboratory Fellows](#)

Los Alamos Reporter (10/25)

Nine researchers have been named 2022 Los Alamos National Laboratory Fellows: David Chavez, Tim Germann, Neil Harrison, Ricardo Lebensohn, Hui Li, Babetta Marrone, Karissa Sanbonmatsu, Lin Yin and Jianxin Zhu. "These nine researchers are some of the best minds in their fields and it is an honor to recognize them as Laboratory fellows," said Thom Mason, Laboratory director.

[Los Alamos Installs Sapphire Rapids-Based 'Tycho,' First Phase of Crossroads](#)

HPC Wire, Oliver Peckham (10/22)

When complete, the Crossroads supercomputer at Los Alamos National Laboratory (LANL) is expected to deliver quadruple the performance of LANL's already-powerful Trinity supercomputer (20.16 Linpack petaflops).

[Los Alamos National Laboratory Announces Winners Of Its Most Prestigious Medals](#)

Los Alamos Reporter (10/20)

Los Alamos National Laboratory announced the winners of three special medals that acknowledge their exceptional commitment and achievement. The Global Security, Operations and Community Relations medals reflect the broad scope of work done across the institution and align with the Laboratory's philosophy of simultaneous excellence.

[More than 10,000 Manhattan Project personnel cards go from print to digital](#)

Los Alamos Daily Post (10/23)

Los Alamos National Laboratory recently digitized a collection of more than 10,000 cards containing the per-

sonnel information of Manhattan Project staff, including famous scientists, such as J. Robert Oppenheimer, Richard Feynman, Emilio Segrè and Edward Teller.

NM scientists work to understand 2020's mass bird die-off and prevent another one

Source NM, Sara Van Note (10/24)

As summer turned to fall in 2020, people from Taos to Las Cruces reported unusual clusters of dead songbirds. Golden warblers, iridescent swallows, pale flycatchers and others were found scattered on riverbanks, huddled under barn eaves and strewn on playing fields.

