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Operational and Mission Highlights

A MONTHLY SUMMARY OF TOP ACHIEVEMENTS

September 2020

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Favorable Drop in Numbers for Transuranic Waste Onsite Inventory

In August 2020, transuranic (TRU) waste inventory onsite at TA-55 fell below 1,500 containers. Multiple groups within the Associate Laboratory Directorate for Weapons Production (ALDWP) have worked collaboratively to achieve this reduction in waste and residue inventory, all within the constraints of COVID-19 safety requirements.

A high number of containers at the facility can cause risk in terms of compliance and criticality safety, as well as cause a roadblock to pit production operations that require room for newly produced waste. This reduction decreases worker dose and enables more efficient movement of operations. During FY20, inventory at TA-55 has been reduced by 44 percent.

In FY20, there have been 35 shipments to WIPP consisting of 1,037 containers. ALDWP is on track to meet its goals for waste inventory by the end of the fiscal year.

Heat Source Production is Three Pellets Closer to DragonFly Milestone

Personnel involved with heat-source production continued work toward achieving milestones, making progress on three plutonium oxide (PuO_2) heat-source pellets. These pellets are produced by hot pressing them from purified heat-source PuO_2 at high temperatures and pressures, forming what is in essence a ceramic. These pellets are then encapsulated (welded) into an iridium-tungsten alloy cladding, thus forming what is known as a general-purpose heat source, or GPHS.

These three pellets are part of an FY20 milestone for the Radioisotope Power Systems Program that supports NASA and specifically the DragonFly mission announced this past year. The Laboratory has been tasked to manufacture 32 GPHS clads for DragonFly. The Lab also supplied the 32 heat sources for the most recent mission, Mars 2020, to power the Mars Perseverance Rover that launched in July 2020.

Hiring Events and Pipeline Program Kickoff Increase Personnel in Weapons Production

In August 2020, the Associate Laboratory Directorate for Weapons Production hosted two virtual hiring events and welcomed the first cohort of a new college pipeline program. The hiring events, which occurred August 6–7 and August 20–21, 2020, focused on specific positions such as hazardous materials technicians, engineers, and machinists. At these hiring events, 118 candidates were interviewed, with 48 on-the-spot offers made. Of these offers, 54 percent were made to residents of New Mexico.

In the meantime, a new pipeline program, in partnership with Santa Fe Community College, kicked off with a first cohort of six students. The program will provide the Laboratory with qualified and educated machinists, an essential skill in maintaining pit production. Students will work as interns at the Lab while completing their two-year associate's degree, with a commitment to work at TA-55 for a minimum of three years.

Laboratory's Plutonium Facility Welcomes Savannah River Engineers to Participate in a Knowledge-Transfer Program for the Pit Mission

On September 21, 2020, the first full cohort of five engineers from Savannah River National Laboratory (SRNL) began a two-year-long stint working at the Laboratory's Plutonium Facility. The first of an expected four cohorts, these engineers are at the Laboratory as part of a memorandum of agreement (MOA) signed in July 2020 to facilitate knowledge transfer between the Laboratory and SRNL in support of the Savannah River Pit Processing Facility (SRPPF) and the nation's pit mission.

The MOA enables up to 20 SRNL engineers to work at the Laboratory on nominal two-year temporary assignments. The visiting engineers will work within the Pit Technologies organization and have two primary objectives:

- First, by working onsite, these engineers will gain first-hand experience with Laboratory processes, which they will apply upon their return to SRNL to support pit production.

- And second, these engineers will benefit from the Laboratory's process development and production ramp-up by performing engineering duties.

A win-win, this collaboration supports the Level 2 milestone for SRPFF. SRNL will send five engineers to the Laboratory every quarter until the program reaches 20 participants.

Plutonium Pit Production NEPA Integrated Project Team Wins Award

The Plutonium Pit Production National Environmental Policy Act (NEPA) Integrated Project Team earned the NA-50 2019 Excellence Award. The team received the award for exceptional accomplishment in support of the NNSA's mission. NA-50 develops and executes infrastructure investment, maintenance, safety, and operations programs and policies.

The NA-50 Excellence Award recognizes outstanding accomplishments involving innovation, effectiveness, teamwork, overcoming adversity, and enabling future success. The team was recognized for its ability to take the lead on providing a NEPA strategy and associated NEPA analyses and documentation for pit production at the NNSA complex. The team integrated and communicated information obtained from program and NEPA subject-matter experts at NNSA Headquarters, field offices, and M&O contractors to ensure the success of all necessary NEPA activity associated with NNSA's pit mission.

The team consisted of members from Los Alamos National Laboratory, the NNSA Los Alamos Field Office, and Savannah River Site. This year, recipients will be recognized in a virtual award ceremony at each site.

SCIENCE, TECHNOLOGY, AND ENGINEERING

3D Model will Enable Remote Design for New Crossroads Supercomputer

The Los Alamos Advanced Simulation and Computing Program is preparing infrastructure to accommodate a new flagship supercomputer, Crossroads, which will be located at the secure Strategic Computing Complex (SCC). However, the COVID-19 pandemic has forced

personnel to work remotely, creating various challenges and making much of the in-person work impossible.

To address this issue, Laboratory engineers developed a 3D Building Information Model (BIM) specifically for the design and installation of Crossroads. BIM creates highly accurate building layouts by using LIDAR (light detection and ranging) scans, together with global-positioning systems. The BIM model produces a highly accurate 3D spatial rendering that enables architectural and engineering (A/E) firms to make the needed spatial measurements and designs to keep the Crossroads installation on track without traveling to Los Alamos and entering a secure facility. Crossroads is scheduled for installation by late 2021.

Beyond Crossroads, BIM will become the as-built model of the SCC. BIM enables any A/E firm to collaborate on a model that can provide the design for new infrastructure upgrades at the facility. It is the intent that all future infrastructure projects will take this approach.

For the workshop's bioinformatics sessions, scientists prepared lectures, real-world examples, and hands-on analysis activities, all of which faced additional challenges in a virtual setting. Finally, this year's workshop also focused on detecting and characterizing SARS-CoV-2 to help participants improve their ability to detect this novel coronavirus in their own countries, as well as to improve the quality of the data they gather and share.

Bioscience Division hosts NASA-GeneLab Hack-a-Thon

In August 2020, the Laboratory's Bioscience Division hosted the first-of-its-kind NASA-GeneLab Hack-a-Thon. The objective of this event was to advance knowledge of space-plant biology.

A comprehensive space-related omics database, the NASA-GeneLab enables users to upload, download, share, store, and analyze spaceflight and spaceflight-relevant data from experiments involving model organisms. These data could lead to valuable insights about how living organisms, such as plants, react to spaceflight environments, and could also help scientists optimize conditions for long-term space visits.

Hosted by B-10 (Biosecurity and Public Health) postdoctoral scientist Colin Kruse, the Hack-a-Thon included cohosts Richard Baker (University of Wisconsin-Madison) and Pankaj Jaiswal (Oregon State

University), along with scientists from 13 institutions worldwide. During one four-hour session, the participants set out to quantify specific characteristics of plant response to spaceflight conditions by collaboratively analyzing plant transcriptome data deposited in the GeneLab database.

During the Hack-a-Thon, participants organized into three teams, each simultaneously tackling a different question about how exposure to microgravity and radiation can cause mutations in plants and how those mutations influence growth. The Hack-a-Thon proved to be a successful way to tackle these problems, so much so that the scientific team plans to continue the collaboration.

CAFÉ Wildfire Smoke Studies Support Air-Quality Decisions

Researchers in the Earth and Environmental Sciences (EES) Division are once again using CAFÉ — the Center for Aerosol-gas Forensics — to study smoke from a major fire. The research team analyzed plumes from northern New Mexico's Medio Fire, which erupted August 17, 2020, and burned 3,700 acres before finally being contained. This team also recently published results from studying Arizona's Woodbury Fire, which burned nearly 124,000 acres.

CAFÉ's in situ observations of fresh smoke enable the development and validation of a fire-emission and dispersion model to help issue timely air-quality alerts. The team originally developed CAFÉ in 2017 to study the chemical properties of aerosols defined by size and to study the aerosols in great chemical detail. CAFÉ can also mimic changes caused by exposure to photochemical processes over days, such as when wildfire smoke plumes travel across the United States. This study is the first complete in situ spectroscopic sniffing of fresh fire smoke in real time from "ignition to suppression" of a New Mexico fire. The aggregate of the smoke's fine particles, darkness, and mass determines the detrimental impacts on human health, local weather, air quality and climate.

News releases: <https://www.lanl.gov/discover/news-release-archive/2020/September/0901-medio-fire.php> and <https://www.lanl.gov/discover/news-release-archive/2020/July/0709-wildfire-smoke.php>

Demonstration of New Capabilities for Eulerian Applications Codes Level 2 Milestone Passed

The Eulerian Hydro and EAP code teams thoroughly demonstrated and assessed new hydrodynamics capabilities for EAP codes. These two teams demonstrated a range of hydrodynamics-only and multiphysics test problems in 1-, 2- and 3-dimensional domains using verification and validation (V&V) analysis and/or by comparing to traditional hydrodynamics methods in EAP codes. The results of this work met completion criteria for achieving this milestone.

Both teams demonstrated credible, flexible, extensible and, in several instances, more accurate alternative hydrodynamics capability within EAP codes. It is refreshing to see the use of more industry/academic-standard techniques, including well-established Riemann solvers, as well as the general skepticism/caution demonstrated by the teams with respect to the new capabilities.

These new capabilities will likely be included in more applications of interest to the complex. These problems will likely help flesh out some of the identified shortcomings associated with errors introduced through the pressure/temperature equilibrium assumption, as well as a lack of proper interface treatments. The porting of the critical loop structures to GPU capabilities (through Kokkos) and the subsequent timing results are highly encouraging, given current trends in High Performance Computing (HPC) hardware.

The teams also received praised for their clear prioritization of delivering production capability to the EAP codebase, particularly during the work-from-home posture caused by the COVID-19 pandemic. Staff members from CCS and HPC divisions, along with other Laboratory divisions, contributed to this effort.

High Performance Computing (HPC) Critical in Maintaining 99% of HPC's Availability through the Work-from-Home Posture caused by the COVID-19 Pandemic

Despite reduced numbers of onsite personnel, the Laboratory has ensured that HPC facilities and computer infrastructure remain secure and functioning properly

while remotely resolving any technical problems in real time.

Since the onset of the COVID-19 pandemic, the Laboratory has maintained an exceptionally high level — greater than 99 percent — of computing availability. This availability enabled continued work on

- annual assessments
- milestones for stockpile stewardship and
- additional COVID-19 application support.

This responsibility includes support of facility operations (power, cooling, etc.) and computer operations (file systems, system software, etc.), together with technical user support. Gabriel De La Cruz and Thomas Moxley, both of the Division's HPC Systems Group (HPC-SYS), helped lead this effort.

Laboratory Contributes to 10 Years of Research and Development on Light-Water Reactors

The Consortium for Advanced Simulation of Light Water Reactors (CASL) recently completed 10 years of research and development on a suite of codes that produced a virtual reactor capable of simulating the physics that govern the performance of light-water reactors. A DOE Energy Innovation Hub, CASL was led by Oak Ridge National Laboratory, with Los Alamos National Laboratory serving as a founding partner.

The Laboratory's steady guiding role — from original proposal through CASL's funding renewal at year five to its conclusion — proved instrumental to CASL's success. The code suite within CASL enabled scientists to address a number of key challenges, defined in consultation with industry at the project's outset. These challenges included addressing pellet-cladding integrity and dealing with CRUD (a form of corrosion) and loss-of-coolant accidents.

A virtual reactor simulation tool set known as VERA (Virtual Environment for Reactor Applications) is being transitioned so that industry stakeholders can use it. This transition fulfills the objective of providing a modern simulation environment that takes advantage of high-performance computing, so that industry can optimize light-water reactor operation and design and extend current licenses while ensuring safety and regulatory compliance.

As a founding member of CASL, Laboratory researchers have made essential contributions to this effort, including

- the development of the MAMBA code to simulate CRUD, and
- designing advanced mechanical performance models of cladding and thermal hydraulics simulations to analyze departure from nucleate boiling.

Laboratory-Developed Machine is Learning Workflow to Enable Shock Simulations from First Principles in Support of the Stockpile Stewardship Program

The accuracy of molecular dynamics (MD) simulations is fundamentally limited by the quality of interatomic forces used at each integration time-step. The gold standard consists of ab initio MD, in which a computationally expensive, density functional property theory (DFT) code is calculated for all forces.

Using the Sierra supercomputer and a new "active learning" workflow, Laboratory scientists have demonstrated that machine-learning models can faithfully emulate the results of DFT calculations at a much reduced computational cost. This unprecedented capability is poised to serve as an important bridge between modeling length scales for the Stockpile Stewardship Program. The Laboratory team behind this innovation includes Kipton Barros, Ben Nebgen, and Justin Smith, all of whom work for the Theoretical Division Physics and Chemistry of Materials group.

Laboratory Leads Key Thrust in Quantum Science Center Collaboration worth \$115 Million

The Laboratory will lead one of three major research thrusts in a collaboration charged by DOE. This overall effort consists of developing quantum technologies as part of the \$115 million Quantum Science Center (QSC). Andrew Sornborger of the Laboratory's CCS Division Information Sciences group will lead the simulations and algorithms thrust. The QSC will have its headquarters at Oak Ridge National Laboratory.

In addition to taking the lead in developing quantum simulations and algorithms, the Laboratory will contribute to the remaining two thrusts. This work includes

- contributing to topological materials and quantum devices,
- developing applications associated with quantum simulation for high-energy and nuclear physics research,
- developing fundamental algorithms,
- designing quantum algorithms for sensing, and
- implementing quantum algorithms on near-term quantum computers.

In addition to the Laboratory, partners in this effort include Oak Ridge National Laboratory, Purdue University, Microsoft, Fermilab, Pacific Northwest National Laboratory, University of California-Berkeley, University of Maryland, Harvard University, University of Washington, UC-Santa Barbara, IBM, Caltech, ColdQuanta, the University of Tennessee-Knoxville, and Princeton University.

The QSC is one of five multidisciplinary National Quantum Information Science Research Centers supported by the DOE Office of Science.

Laboratory Sets a New Record for R&D 100 Award Finalists

On September 21, 2020, *R&D World* magazine's R&D 100 committee announced its selections for the 2020 finalists. The Laboratory had 10 entries on the finals list this year. Since 1978, the Lab has submitted entries to this competition, the results of which are known as the "Oscars of Invention." Never before has the Laboratory garnered so many finalists. Despite shutdowns and remote work, the Laboratory completed 11 entry packages and 10 accompanying videos. This success builds on the Lab's 2009 success of nine award-winning entries — another record.

R&D 100 Award winners will be announced October 1, 2020. Laboratory finalists include the following:

- [Amanzi-ATS](#): open-source software that includes the most complete suite of surface/sub-surface physical processes to model complex environmental systems across multiple scales.
- **Cluster Integrity, Exception Resolution and Reclustering Algorithm (CIERRA)**: this software analyzes great amounts of satellite-collected lightning observations to provide the most comprehensive and accurate understanding of lightning data.
- [Electrochemical Hydrogen Contamination Detector](#): protects zero-emission fuel cells by

detecting the presence of impurities in hydrogen fuel.

- [Legion](#)—a data-centric HPC programming system: open-source software that boosts application performance and speed of computing by automating task scheduling and data movement.
- [Multi-Burn Solid Rocket](#): provides multiple independent thrusts from a single solid rocket to enable small satellites to maneuver, avoid debris and de-orbit.
- [Oleo-Furan Surfactants Made from Renewable Biomass](#): a new class of nontoxic, nonirritating surfactants for laundry detergents. These surfactants perform effectively in cold and hard water.
- [OrganiCam](#): the first camera for noncontact, nondestructive biodetection in remote environments and space.
- [QUIC-Fire](#): software that is the first laptop-capable, fast-running 3D fire-atmosphere feedback model for wildland fire management.
- [Smart Microbial Cell Technology](#): an ultra-high-throughput screening platform to engineer custom biocatalysts that enhance the rate of chemical reactions critical in pharmaceuticals, renewable energy, and environmental cleanup.
- [Spectroscopic Detection of Nerve Agents \(SEDONA\)](#): the only portable screener that can accurately detect chemical nerve agents in unopened bottles, providing results in seconds.

Laboratory Stockpile Scientists Deploy a New Charged-Particle Transport Library (CP2020)

Laboratory stockpile scientists, including Mark Paris of the Theoretical Division Nuclear Particle Physics, Astrophysics and Cosmology (T-2), have developed, processed, documented, and released a new library of charged particle (CP) reactions. This new CP2020 library uses recent and more comprehensive experimental data on cross-sections, angular distributions, and spectra. The new library also provided better data than that contained in the CP2011 library.

Delivering physical data libraries includes testing, processing, and releasing the data in different formats (e.g., continuous-energy, multi-group, and multi-temperature) suitable for applications. As part of this

effort, scientists employed and improved modern versions of the Lab's data-processing code (NJOY21) and the Nuclear Data Interface. The new CP libraries are already providing insight into important stockpile stewardship applications.

Los Alamos Hosts Virtual Visit from DOE's Geothermal Technologies Office

From September 1 to September 3, 2020, the Laboratory hosted virtual tours of laboratories and research that support the Geothermal Technologies Office (GTO), a component of DOE's Office of Energy Efficiency and Renewable Energy (EERE). Applied Energy Program Deputy Director George Guthrie led these virtual tours — one of the Laboratory's first and largest of its kind.

Hosts for this visit were Patrick Fitch, Associate Laboratory Director for Chemistry, Earth, and Life Sciences; Melissa Fox, Applied Energy Program Director; and Andrew Wolfsberg [Earth and Environmental Sciences (EES) Division Leader] and Heather Dion (ESS Deputy Division Leader). Tour recipients were GTO Director Sue Hamm and Alexis McKittrick, Program Manager for the Office's Hydrothermal Resources and Low Temperature and Coproduced Resources.

The tours encompassed four principal themes that addressed the complex natural and engineered systems and physics of machine learning, illuminating subsurface and synergistic opportunities.

- **Theme 1** highlighted how the Laboratory improves reservoir management efficiency. EES personnel led tours of the Earth Fracture Lab and the Microfluidics Lab.
- **Theme 2** provided an update about Cloud-based fusion between big data and multiphysics models, as well as a discussion that highlighted efforts to transform the discovery of hidden geothermal systems.
- **Theme 3** highlighted how the Laboratory improves wellbore-based measurements, including an advanced downhole acoustic sensing update and a tour of the EES Nonlinear Acoustics Lab. A Physical Sciences associate directorate scientist also led a tour of the Linear Acoustics Lab.
- **Theme 4** addressed how the Lab helps extract significant subsurface knowledge from geo-

physical measurements, including applying machine learning and imaging to fractures, stress characterization and permeability in geothermal systems.

EES also led tours of the recently expanded Los Alamos Seismic Network and the Laboratory's UAV (unmanned aerial vehicle) platform. Many presenters provided vignettes and prompted discussion of how to extract valuable subsurface knowledge.

The last focus, synergistic opportunities, led by Fox, included a recovery review of critical materials and a tour of the Laboratory's High-Pressure Geochemistry Laboratories. The tours concluded with Guthrie and EES colleagues highlighting efforts supporting DOE's SMART initiative.

Luis Chacon Named Point of Contact for ASCR's Applied Mathematics Component

Luis Chacon of the Theoretical Division Applied Mathematics and Plasma Physics (T-5) will serve as the Laboratory's point of contact for the applied mathematics component of the Advanced Scientific Computing Research (ASCR) portfolio. Chacon replaces Peter Swart (also of T-5), who served the Laboratory in this role with great distinction for more than a decade.

Chacon joins Pat McCormick and Galen Shipman of the CCS Division's Applied Computer Science Group (CCS-7), both of whom continue in their roles as Laboratory points of contact for, respectively, the computer science and computational partnership portions of the ASCR portfolio.

New Funding Granted to Study Crop Pathogens and Infectious Diseases

Laboratory scientists from the Bioscience Division are participating in the National Predictive Modeling Tool Initiative (NPMTI), funded by the Department of Agriculture. The overall goal of NPMTI is to develop tools to help ensure crop sustainability and quality, increase the precision of pesticide use, improve soil health, and improve crop-disease management to reduce yield losses.

The Laboratory team's role is to develop a central repository of different data streams to forecast infectious disease in crops of economic importance to the Unit-

ed States, as well as to facilitate forecasting disease spread. This work will leverage established Laboratory models and visual analytics developed for human infectious disease surveillance and forecasting.

Armed with research-backed information about diseases, growers and their consultants will be able to make better-informed management decisions that could prevent crop losses in corn, wheat and cotton. A large consortium, the National Predictive Modeling Tool Initiative consists of several land-grant universities, the National Ag Genotyping Center, and the Laboratory.

To learn more about the initiative, visit <https://agpmt.org>.

On September 14–16, 2020, the Laboratory held the Complex Natural and Engineered Systems Capability Review

On September 14–16, the Laboratory through WebEx held the Complex Natural and Engineered Systems (CNES) Capability Review. This year, the review covered the complete pillar, which underwent a significant strategic update during 2019–2020. Challenge areas were as follows:

- explain the complex interactions and resulting impacts between natural environments and human actions from nuclear threats;
- design, build, protect, predict, and control engineered systems; and
- explain the complex interactions and resulting impacts between natural environments and human actions involving nonnuclear threats.

The review committee consisted of distinguished reviewers from government and academia. Chairing the committee was Bruce Warner, former PADGS from Lawrence Livermore National Laboratory (retired). Associate Laboratory Directors from the Laboratory included participants from ALDCELS (the organizing entity), ALDGS, ALDSC, and ALDW.

The review out-brief was quite complimentary with respect to the capabilities highlighted. Moreover, a number of useful recommendations for improving Laboratory efforts in CNES were presented. A full report based on the review is forthcoming.

Statistical Detective Work to Understand Radioactive Release at WIPP earns a Gold Patricia E. Gallagher Environmental Award

The following three-person team received a gold-level Patricia E. Gallagher Environmental Award: Statisticians Elizabeth Kelly and Brian Weaver, both of the CCS Division's Statistical Science Group (CCS-7), along with chemist Kirk Veirs from the Actinide Material Processing & Power Division's Material Recovery and Recycle Group (AMPP-4). The "StatChem" team was honored for their rapid statistical sleuth work to track down the source of the WIPP radioactive release, which was crucial for allowing WIPP to reopen last year. Kelly gave an invited talk about this work at the Conference on Data Analysis (CoDA) 2020.

On February 14, 2014, DOE's WIPP released radioactive material into the environment. Because of this incident, WIPP — the nation's only transuranic waste depository — was shut down until 2017 at a cost of \$500 million to clean it up.

The StatChem team's novel analysis, in conjunction with extensive experimentation, resulted in an understanding of the WIPP event, the safe remediation and repackaging of problematic materials, and the resumption of regular shipments of transuranic waste from the Laboratory to WIPP starting in April 2019, five years after the incident.

The team's quick research effort was tremendously beneficial to DOE's environmental management program, enabling personnel to lower the harm of the transuranic waste and ensure worker health and safety while providing a positive impact to the community. This team's tireless efforts in solving an important problem to the DOE Complex and the nation earned them the Patricia E. Gallagher Environmental Award.

A WebEx virtual award ceremony for all recipients of Patricia E. Gallagher Environmental awards took place on September 2, 2020.

MISSION OPERATIONS

End of Fiscal Year Progress inside PF-4

Teams inside the Plutonium Facility (PF-4) are successfully paving a path toward the third pit build of the fis-

cal year. In the past month, Laboratory personnel have made progress in electro-refining (ER) ring runs, metal recovery from old pits, and machining.

The final ER run of FY20 was successfully completed last week. Of 38 total runs during the fiscal year, 34 were successful, resulting in purified plutonium metal crucial to production efforts. An initial evaluation of metal recovery from old pits yielded results that will (1) contribute to October inventory planning, and (2) better forecasting of future waste generation and worker dose. Personnel also completing machining and cleaning processes of other parts and components, some of which enabled assembly operations to begin in earnest.

FIN-CAT Completes FY21 Forward Pricing Package for NNSA

Just one month after receiving NNSA's annual request, the Laboratory's Finance Cost Accounting (FIN-CAT) group gathered data and submitted the FY21 forward pricing rates package. This package consists of proposed overhead and standard labor rates, both of which are derived by reviewing budgets and analyzing the outlook for the upcoming fiscal year.

In addition to compiling the FY21 rates, FIN-CAT provided information about the FY20 rate performance at summary and detailed levels. The performance of FY20 rates took into account several contributing factors to demonstrate why the rates performed like they did. Given this information, personnel make small rate adjustments from year to year.

Compiling the package by the given deadline required an immense amount of coordination among staff members who are all working remotely through virtual meetings and email communications.

Finance Division Presents at NNSA's Meeting on the Forward-Pricing Rate

On September 1, NNSA hosted its three-day annual Forward-Pricing-Rate review. This third annual meeting was the first conducted in a virtual setting.

During the meeting, management and operations (M&O) contractors, such as Triad National Security, LLC, met with NNSA oversight program-management personnel and representatives from other laboratories

to discuss the outlook for operations, as well as indirect cost rates for the upcoming year.

On September 2, the Laboratory's Finance (FIN) Division presented the Lab's operating environment, rates and assumptions for FY21, and the rates outlook through 2025. Representatives from the FIN Weapons Finance group joined the discussion, providing additional considerations. Laboratory representatives viewed other M&O presentations, gaining valuable insight into the outlook for NNSA's complex in the upcoming year.

Laboratory's General Employee Training Converts to Online Exam

A comprehensive course, General Employee Training (GET) acquaints new employees with the following:

- the Laboratory's safety and security culture,
- facilities,
- policies and procedures,
- emergency plans and protection,
- quality-assurance programs, and
- radiological health and safety programs.

This training consists of two components: the GET course and the GET exam. Although the course remains unchanged, the former in-person exam is now available online. This process means that new hires no longer have to be physically present onsite in a proctored setting to take the exam.

Laboratory personnel converted the GET exam online to accommodate social distancing and teleworking efforts. This change is permanent going forward, regardless of employee on- or offsite work status in the future.

Laboratory Receives Superior Star Award from DOE VPP Office

Los Alamos National Laboratory received the Superior Star Award from DOE's Voluntary Protection Program (VPP) Office. The program office gives this award to sites that approach a recordable incident injury rate 50 percent better than the average of other U.S. businesses in the same industry code.

Every year, Los Alamos submits a report outlying all its efforts in the VPP program and all its tenets:

- management leadership,

- employee involvement,
- worksite analysis,
- hazard prevention, and
- control and health safety and training.

The Lab earned the Superior Award for demonstrating the effective use of challenging goals, as well as for its significant mentoring and community outreach efforts.

The award was presented to the Laboratory in a virtual ceremony on September 21, 2020.

Laboratory Recommended for ISO14001 Recertification

Every three years, the Laboratory goes through an audit to recertify that it complies with ISO14001, a set of standards that are part of the Lab's Environmental Management System (EMS). This year, the NSF auditor team recommended the Laboratory for recertification to the standard, which will start a new three-year cycle.

The team noted that the Laboratory had no findings of nonconformity and was recognized for several positive practices, including the following:

- Proactively engaged legal counsel in numerous organizational environmental action plans, including a more robust and formal engagement with review/approval of organizational requirements documents, as well as proactive engagement with external regulatory bodies to address environmental regulations that directly affect operational processes.
- Demonstrated overall commitment of continued engagement and transparency as it relates to external interested parties.
- Continued to drive overall system improvements through leadership engagement and accountability.
- Maintained a robust Readiness Assurance Program Plan for Emergency Preparedness and Response that continued to drive improvements.
- Achieved an excellent audit support system, with conference scheduling, organizers, document-sharing folders, and a willingness of Lab employees to participate and provide requested documentation. All these factors demonstrated a commitment to the EMS program.

This auditing experience, fully remote through Webex, was a substantial part of the Laboratory's success.

It was a community effort and would not have been possible without the support of employees across the Laboratory.

LinkedIn Learning Offers New Professional Development Opportunities

The Laboratory has made available LinkedIn Learning subscriptions to all its employees. An individualized, self-paced and online professional development program, LinkedIn Learning provides thousands of relevant courses taught by industry experts.

LinkedIn Learning will help Lab employees learn new skills applicable to their current professions and can equip them to pursue growth opportunities elsewhere at the Laboratory. Learning paths include numerous career roles, such as project management, cloud computing, data science, leadership and management, finance and accounting, and customer service. There are more than 16,000 courses available in seven languages, with more added every week.

Providing access to LinkedIn Learning is part of an Employee Development program that addresses several Laboratory Agenda objectives, including changing the Lab's culture with an emphasis on organizational learning, as well as enhancing work-life quality and workforce planning, training and development.

LOMA Training Helps 25 Managers to Further Promote Laboratory's Strong Safety Culture

Held on August 31, 2020, the Laboratory Operations Manager Academy (LOMA) attracted 25 participants to the White Rock Training Center. LOMA guides managers on how to influence the behavior of personnel to ensure a strong safety culture. The daylong training began with ADLFO's Reed Sharp, who introduced LOMA's purpose and objectives. Bret Simpkins then gave a powerful safety presentation, which led to a discussion about the Laboratory's Safe Conduct of Research Principles, or ScoR.

Scott Tingey, Reed Sharp, and many other leaders across the organization worked with attendees in interactive scenarios, with roles for participants and observers. Attending leaders lauded the enthusiasm of participants when it came to promoting a culture of safety and trust. All participants earned Laboratory

challenge coins. Five rooms were allotted for this training to ensure social-distancing precautions designed to protect against the COVID-19 virus.

Site Cleanup Program Metals Team earns Patricia E. Gallagher Award

The Site Cleanup Program metals team won a Patricia E. Gallagher Environmental Award for releasing and recycling 1.5 million pounds of metal in 2019. This team includes staff members from Facilities and Operations (ALDFO); Environment, Safety, Health, and Quality (ALDESHQ); and Professional Support Staff (ALDPSS).

Nominated by Gary Hagermann, Facility Operations Director for the Los Alamos Neutron Science Center (LANSCE), the project, “Potentially Activated Metal Recycle,” earned a gold award, otherwise known as a Pollution Prevention award. This award is a special recognition category of the Patricia E. Gallagher Environmental awards.

For many years, there was metal shielding, equipment, and magnets all around TA-53. This metal was from near the beamline and was considered potentially activated (radiological). Until several years ago, there was no proven technical method to release and recycle such metal. Options at that time were to let it decay in a radiological control area, which could take longer than 20 years, or treat it as a low-level waste. Both options were costly and a burden to programs that lacked a funding source.

The former Metals Working Group worked with subject-matter experts to develop a technical baseline document for the metal’s release. With the process, 95 percent of the metal could be released for recycle. This detailed process consists of several steps performed by a dedicated team. The end result is that metal is recycled instead of sitting around for decades or treated as low-level waste. This new process is a great success for the Laboratory because it reduces environmental risk and enables personnel to clean up outdoor spaces.

In 2019, the team focused on a backlog of metal — its goal was to release and recycle 500,000 pounds. The team’s attention to detail and hard work is what made 2019 a capstone year. Not fully satisfied, the team exceeded its goal, releasing and recycling 1.5 million pounds of metal. This Laboratory record equates to more than 240 pieces of metal and more than 35 truckloads.

The Site Cleanup Program oversees this work, with funding from the NA-532, Office of Nuclear Material Integration. Work is executed in collaboration with Accelerator Operations and Technology; Deployed Environmental Safety and Health–LANSCE Facility Operations; Environmental Protection and Compliance–Environmental Compliance; LANSCE Facility Operations; and Logistics.

Work Paused, Restarted Safely after Cable Snagged

In late August 2020, a backhoe operator snagged a 1-0 ground cable while working on the HVAC (heating, ventilation, and air conditioning) upgrade at the Weapons Engineering Tritium Facility (WETF). Work was paused and Operations, Engineering, and the project’s subcontract technical representative were consulted. The J.B. Henderson crew was remediating the service-trench area for the HVAC’s new chiller pad. The area around this trench was being prepared for subsequent asphalt repair.

When the operator snagged the cable, workers informed the WETF Deputy Director. Immediately consulted were the WETF HVAC engineer, the WETF electrical cognizant system engineer (CSE)/electrical safety officer, and the WETF Facility Structure CSE, all of whom were onsite.

After a visual inspection and a phone consultation with the Lightning Protection System CSE, personnel determined the cable was part of a previously located and formerly abandoned ground rod and conductor system. The Weapons Facility Operation facility design authority representative, along with WETF’s operations manager, were told the cable could be removed because it had been abandoned in place. Work was restarted and the cable and ground rod were both removed from the area. This event took approximately 30 to 45 minutes.

COMMUNITY RELATIONS

“Community Desk Project” Builds Desks for Students in Need

New Mexico students attending school virtually face many new challenges, but thanks to David Gunter of the CCS Division’s Applied Computer Science group, one of these challenges has been already addressed. As reported on September 22, 2020, during the ABC

World News segment “[America Strong](#),” Gunter put his woodworking skills to use and built homemade school desks with “wood, nails, and lots of love.” This volunteer project, known as the Community Desk Project, met a demand for age-appropriate desks because many online vendors were quickly running out of desks and office stores did not have appropriately sized desks for kids.

To date, Gunter and his wife Sonya have made 18 desks and plan to make at least 30 more to donate to local kids. More details about the project are on the [Community Desk Project webpage](#).

Laboratory Hosts Popular Virtual Community Conversation

On September 2, 2020, the Community Partnerships Office hosted a virtual Community Conversation on Education and Workforce. More than 190 invited community leaders attended this event.

Laboratory Director Thom Mason spoke about projected Laboratory workforce needs. He also addressed how partnerships with educational institutions in northern New Mexico are creating employment pathways for students in the region.

Also taking part in the event were State Lieutenant Governor Howie Morales, Cabinet Secretary of Workforce Development Bill McCamley, and Cabinet Secretary of Public Education Ryan Stewart. These individuals outlined New Mexico’s role in supporting workforce development. Heather Sherman, STEM Relationship Manager from Battelle Education gave examples of successful partnerships in Ohio, and representatives from N3B, Pojoaque Valley School District, and Santa Fe Community College discussed projects in the region.

Laboratory-Supported Program helps Parents, Teachers, and Students find Free Remote-Learning Resources

Parents, teachers and students can now find a variety of regional and national resources for science, technology, engineering, art, and math (STEAM) education consolidated in one convenient site. Supported by the Laboratory, this online, one-stop shop provides child-care resources, parent guides for online learning, and STEAM activities to work on at home. The site offers various kinds of support including

- teacher guides to create video lessons and podcasts;
- parent guides for virtual K–12 learning;
- resources such as virtual events, virtual field trips and hands-on activities to do at home;
- locating free internet hotspots through a Hotspot Map; and
- searching local childcare options through a Child Care & Connection Hub.

Visitors to the site will also find learning opportunities in STEAM from regional partners, such as Explora, Twirl, and STEM Santa Fe, as well as national organizations like Battelle Memorial Institute, Khan Academy, NASA, TGR Foundation, and the math-education website [youcubed.org](#).

This free, online resource is collective action initiative of the New Mexico STEAM Coalition. It was developed with support from the LANL Foundation, Los Alamos National Laboratory, Triad National Security, LLC, and the Community Learning Network.

Read the [news release](#) for more details.

The Laboratory Wins Department of Energy Small Business Awards for FY19

The Laboratory in FY19 spent \$396 million in procurement contracts with New Mexico businesses. Of these funds, \$289 million — 73 percent — went to contracts with small businesses in New Mexico. In addition, the Laboratory significantly increased contracts with businesses categorized as (1) small disadvantaged, (2) small women owned, (3) small veteran owned, and (4) small HUB Zone from FY18. Small Business Awards earned by the Laboratory included Facility Management Contractor Small Business Achievement of the Year (Triad National Security, LLC) and Laboratory Director of the Year (Thom Mason).

New Grant Funds Best Practices in Teacher Training

New Mexico Highlands University and the Laboratory have joined forces with four public school districts to increase the number of highly skilled teachers in the state. To carry out this objective, the collaborators received a grant of \$321,381 from the New Mexico Public Education Department.

"As a committed community partner, Los Alamos National Laboratory believes in supporting educators as they prepare the next generation to join the workforce and bring prosperity to the region," said Laboratory Director Thom Mason. "I thank the state of New Mexico and our partners in elementary, secondary, and higher education for coming together for this game-changing initiative where we all stand to win."

The four public school districts are Albuquerque, Bernalillo, Pojoaque Valley, and Santa Fe. The project is an outgrowth of the Regional Partnership School, a collaboration among Pojoaque Valley Schools, New Mexico Highlands University, and the Laboratory — the first of its kind among a public school, public university, and regional employer in New Mexico.

COMMUNITY EVENTS

September 16–23

Community Partnerships Office Director Kathy Keith appeared on the talk radio show "Business Matters," hosted by Santa Fe Chamber of Commerce President Bridget Dixon. This radio show aired on KRTC 103.7 FM. Keith discussed ways in which the Laboratory serves as an economic driver in the region (prerecorded).

September 16–23

Coordinated by DOE, the Bradbury Science Museum (BSM) virtual booth at the USA Science and Engineering Fair featured BSM educator Mel Strong, who presented information about the Laboratory, its beginnings with the Manhattan Project, and a discussion of energy in weather systems.

September 19

Nonprofit MANA del Norte hosted its first Annual Hispanic Heritage Month Scholarship Banquet via Zoom. The Laboratory was a sponsor of this event.

September 21

Laboratory Director Thom Mason, along with leaders from the National Nuclear Security Administration, met with the New Mexico Secretary of Workforce Development and Governor's Staff on Higher Education and discussed Laboratory workforce needs and ways the state could help.

September 21

Virtual Science on Tap event, featuring a Laboratory scientist, was held from 5:30 p.m. to 7 p.m. This event was open to the public.

September 21–25

The Bradbury Science Museum (BSM) virtual booth was at the New Mexico STEM Festival. Coordinated by Explora, the BSM booth featured BSM educator Mel Strong, who presented a tutorial on cloud watching.

September 22

A Laboratory-organized blood drive took place at Smith's in Los Alamos.

September 23

The Santa Fe Chamber Business Expo and Job Fair was held. Laboratory recruiters participated in this virtual event, which was sponsored by Triad National Security, LLC.

Sept. 26–Oct. 3

The BSM held a virtual booth at the USA Science and Engineering Fair. Coordinated by DOE, this booth featured BSM educator Mel Strong. Strong provided information about the Laboratory, the beginnings of the Manhattan Project, and a discussion about energy in weather systems.

September 30

The Laboratory hosted a virtual meeting of the Math Teacher Leader Network, a group of principals and teachers from six regional school districts engaged in professional development. These six schools are Los Alamos, Española, Pojoaque, Cuba, Bloomfield and Santa Fe. This session focused on student engagement in an online environment. Laboratory staff members coordinated the event, with the LANL Foundation providing fund stipends for participating teachers and guest speakers.

October 1

Northern New Mexico classrooms began to take interactive field trips to the Bradbury Science Museum. Topics included the Manhattan Project and building immunity.

October 3

Virtual kickoff takes place for the 2020–21 Supercomputing Challenge. The Laboratory will sponsor this event, with personnel having reached out to organizers to see if they would like a Lab manager to speak.

October 3

Volunteers from the Laboratory Carpenters Union carry out a service project for LARSO (Los Alamos Retired and Senior Organization) at the Betty Ehart Senior Center. Work includes weeding, tree removal and replanting.

October 7, 2020

The Laboratory presents Frontiers in Science, a public-speaker series featuring Laboratory Fellows. Nina Lanza will present *The NASA Perseverance Mars Rover: Looking for Signs of Past Life*. This is a virtual event.

October 19

Virtual Science on Tap presents Karissa Sanbonmatsu of the Laboratory's T-6 group. Sanbonmatsu discusses heart RNA at this public event.

SELECTED MEDIA COVERAGE

[Commitment to Training New Students](#)

APS Physics (solicited letter)—Priscila Rosa, staff scientist, Los Alamos National Laboratory (8/27)

In early March, Los Alamos National Laboratory (LANL) established that telecommuting would be the new default. My husband, who is also a co-worker, and I adapted easily and focused on writing manuscripts and grant proposals and on planning for the eventual reopening.

[LANL Leads Key Thrust In \\$115 Million Quantum Science Center Collaboration](#)

Los Alamos Reporter (8/27)

The Laboratory will lead one of three major research thrusts in a collaboration charged by the Department of Energy with developing quantum technologies as part of the \$115 million Quantum Science Center (QSC). The QSC will be headquartered at Oak Ridge National Laboratory in Tennessee.

[Three Big Threats to satellites — and What to do About Them \(op-ed\)](#)

Space.com—Herb Funsten (8/27)

Since the dawn of the space age in 1957, 80 countries and intergovernmental organizations have launched more than 9,000 objects into space — with nearly 800 in just the past year.

[Los Alamos Scientists Help NASA with Asteroid Mission](#)

KOB-TV (8/28)

A simulation created at Los Alamos National Laboratory could help NASA on a mission to an asteroid — an asteroid that could hold a lot of answers to how our solar system formed.

[Technology Transfer Program Now Open](#)

Albuquerque Journal (8/28)

A new state program allows eligible New Mexico companies to work with scientists and engineers at Sandia or Los Alamos national laboratories to advance

technology developed at the labs into market-ready programs and services.

[A Collaboration Designed to Beat COVID-19](#)

Santa Fe New Mexican—Thom Mason, Jason Mitchell and David Scrase (8/29)

As COVID-19 began to spread throughout the United States, New Mexico's public health agencies, national laboratories and health care organizations were already strategizing ways to effectively stem the spread when it reached our state.

[Carol Burns Receives ACS Francis P. Garvan-John M. Olin Medal](#)

Los Alamos Reporter (9/2)

Carol Burns, executive officer for the Deputy Director for Science, Technology & Engineering at Los Alamos National Laboratory, was selected as the recipient of the 2021 American Chemical Society's Francis P. Garvan-John M. Olin Medal. This national award recognizes distinguished service in the field of chemistry by female chemists.

[Los Alamos Takes New HPE Apollo 80 System on a Test Drive](#)

HPC Wire (9/2)

Los Alamos National Laboratory recently began using HPE Apollo 80 Systems from Hewlett Packard Enterprise (HPE) that feature Fujitsu A64FX Arm processors for evaluation of some of the most demanding physical simulation workloads in the world.

[Mars 2020 Mission Looks to Find Signs of Ancient Microbial Life](#)

Forbes—Linh Anh Cat (9/6)

Scientists use patterns found in extreme environments on Earth to help them narrow their search for life on Mars. Dr. Nina Lanza, is a planetary scientist at Los Alamos National Laboratory.

[New Antiseptic Kills Antibiotic-Resistant Bacteria](#)

Albuquerque Journal—David T. Fox (9/6)

To battle super-resilient bacteria, scientists at Los Alamos National Laboratory have developed a new topical ointment designed to kill what were once considered "unkillable" bacteria.

[LANL Expects To Hire 1,000 A Year For The Next Two Years](#)

Los Alamos Reporter—Maire O'Neill (9/7)

Los Alamos National Laboratory Director Thom Mason told participants in a LANL Community Conversations virtual event Wednesday dealing with education and workforce, that it's kind of refreshing to be talking about things that are a little more forward-looking.

[LANL Scientists Study Impact of Wildfires on Health, Environment](#)

KOB—Brett Luna (9/9)

The wildfires burning across the western United States have been sending smoke across New Mexico. Scientists at Los Alamos National Lab wanted to take a closer look, so they turned on their aerosol-gas forensics instruments.

[Virtual Night with a Nerd with Harshini Mukundan is Sept. 10](#)

Los Alamos Reporter (9/9)

In a virtual Night with a Nerd talk, 6 p.m. to 7:30 p.m. Thursday, Sept. 10, biomedical scientist Harshini Mukundan will discuss current strategies for diagnosing infectious diseases, plus a universal bacterial sensor, developed by her team, that is an innovative option for the future.

[Supporting the Whole Child](#)

Taos News—Anjeli Doty (9/9)

In response to the statewide school closures in March, a coalition of regional organizations in Northern New Mexico combined forces to launch the New Mexico STEAM (science, technology, engineering, art, and math learning) Hub. Spearheaded by the Los Alamos National Laboratory Foundation and the Community Learning Network, this interactive, online platform connects families, educators, and communities around shared resources.

[The Hall Effect Links Superconductivity and Quantum Criticality in a Strange Metal](#)

Phys.Org—Ingrid Fadelli (9/14)

Researchers at the University of California, Berkeley (UC Berkeley), and Los Alamos National Laboratory have been investigating the anomalous transport properties of strange metals, along with several other teams worldwide.

[How New Mexico Controlled the Spread of COVID-19](#)

Scientific American—Christie Aschwanden (9/15)

Early in the spring, the state put together a team of 150 researchers and clinicians to advise its officials, and New Mexico has been “very proactive in implementing science-based decisions,” says Sara Del Valle, a mathematical and computational epidemiologist at Los Alamos National Laboratory.

[Mutant Virus: Should We be Worried that Sars-CoV-2 is Changing?](#)

The Guardian—Laura Spinney (9/18)

Scientists are wary of mutations that spread rapidly, especially if they do so in separate locations, because they might belong to that rare minority that change

the way the virus behaves – perhaps by making it more transmissible between people or better able to evade the host’s immune system. . . Back in the spring, at the Los Alamos National Laboratory in New Mexico, the computational biologist Bette Korber and her team were busy building the mathematical tools that would flag up such repeat offenders in the GISAID data.

[Rod Borup Named 2020 Electrochemical Society Fellow](#)

Los Alamos Reporter (9/20)

Rod Borup, of Los Alamos National Laboratory’s Materials Synthesis and Integrated Devices group, has been named a 2020 Electrochemical Society (ECS) Fellow.

[Finalists for 2020 R&D 100 Awards are Unveiled](#)

R&D World—Paul Heney (9/21)

Finalists for the 2020 R&D 100 Awards have been announced by R&D World magazine. Los Alamos National Laboratory has 10 finalists.

[New Mexico Governor’s STEM Challenge goes virtual, Registration Extended to Sept. 24](#)

Hot103—Martin Fernandez, Jr. (9/21)

Due to COVID-19 safety precautions, the 2020 New Mexico Governor’s STEM Challenge has transitioned to an all virtual event including the statewide STEM Showcase to be hosted by New Mexico State University Dec. 5, and the registration deadline has been extended. The NM Governor’s STEM Challenge partners including NMSU, the New Mexico Department of Workforce Solutions, Los Alamos National Laboratory Foundation and the New Mexico Public Education Department will be joined by industry partners from across the state.

[The Quantum Butterfly Non-Effect](#)

Scientific American—Nikolai Sinitsyn and Bin Yan (9/21)

A concept familiar from chaos theory turns out to work differently in the quantum world.