PHYSICAL SCIENCES

VISTAS

PERSPECTIVES ON EXCELLENCE IN MISSION OPERATIONS
AT LOS ALAMOS NATIONAL LABORATORY // SPRING 2019

Mag lab upgrades power mission delivery

LANSCE project accelerates proton beam operations

Catching fire: video captures what happens when depleted uranium ignites

Los Alamos
NATIONAL LABORATORY
EST. 1943

Gerri Barela (Physics Division, P-DO) (left) and Mel Borrego (LANSCE Weapons Physics, P-27) keep their "heads up, devices down" while crossing the street at the Los Alamos Neutron Science Center. The safety campaign, conceived by Borrego, reminds workers to pay attention to their surroundings, particularly around moving vehicles and other pedestrian hazards.

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LEARN MORE ABOUT PHYSICAL SCIENCES AT LOS ALAMOS NATIONAL LABORATORY
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On the cover: Lab staff and external contractors recently completed a successful repair to the National High Magnetic Field Laboratory-Pulsed Field Facility's 1.4-billion-watt generator system. The project helps ensure the facility delivers on its fundamental and national security science missions for decades to come. The overlay shows field profiles of the facility's pulsed magnets.

FROM TONI'S DESK

Toni Taylor, Associate Laboratory Director for Physical Sciences

I am proud to introduce the second issue of *Physical Sciences Vistas*, with a focus on "excellence in mission operations." Los Alamos National Laboratory overall, and our Physical Sciences Directorate (ALDPS) specifically, is known for excellence in our NNSA and DOE missions as well as our science and technology. Excellence in mission operations requires the execution of sustained operations that are reliable and responsive to mission needs across all work being performed in ALDPS, and thus underpins our ability to excel in our S&T and our missions. For all of us, adherence to the Principles of Safe Conduct of Research (delineated below) is essential to achieving a safe and productive environment that enables excellence across the board.

ALDPS is a complex organization, with hazards ranging from radiological to electrical to chemical to electromagnetic, and a mostly experimental footprint that extends to many areas of the Laboratory. Operations are essential to the success of all of our programs. Highlights of our outstanding operational work that benefit our ability to deliver on mission featured in this issue include the following.

- The modernization project to improve the reliability of the generator system that provides power to the world-class magnets at the National High Magnetic Field Laboratory-Pulsed Field Facility.
- The installation of a shield wall on Line C of the LANSCE accelerator that will increase productivity at the Proton Radiography and Ultracold Neutron facilities.
- The multiyear cleanup effort on the LANSCE mesa that allows materials to be reused, recycled, or disposed of.
- The installation of a new cryocooling system at the Ultracold Neutron Facility to improve safety and reliability.
- Preventative maintenance activities needed for power performance and reliability at the LANSCE accelerator.
- A time-sensitive chemical inventory undertaken to ensure that chemicals in use in our labs are disposed of prior to degradation to hazardous forms.
- A manufacturing safety and training video demonstrating a depleted uranium fire and the appropriate management of such a fire.

This issue concludes with an overview of the recipients of the 2018 Los Alamos Employee Scholarship Fund (LAESF). I note that the LAESF giving campaign starts this month.

Finally, as one of the LOSA/SAFE co-champions (with Bret Simpkins), I am happy to report that our sessions are fully subscribed and are proceeding smoothly. I attend both the introduction/orientation meetings prior to participants attending the workshops and the debriefs following the workshops. From the latter, I find that attendees across the Laboratory believe that these workshops are valuable and they gain insight into how to improve their approach to safety and operations. We are planning alumni activities to allowed continued networking and sharing of lessons learned and best practices.

Toni

LOSA/SAFE Principles

- Everyone is personally responsible for ensuring safe operations.
- Leaders value the safety legacy they create in their discipline.
- Staff raise safety concerns because trust permeates the organization.
- Cutting-edge science requires cutting-edge safety.
- A questioning attitude is cultivated.
- Learning never stops.
- Hazards are identified and evaluated for every task, every time.
- A healthy respect is maintained for what can go wrong and what must go right.

Operational excellence in the extreme

Mag lab modernization project delivers more consistent, reliable power supporting mission delivery

At the heart of the National High Magnetic Field Laboratory-Pulsed Field Facility is a $30 million pulsed power infrastructure, which includes the 1.4-billion-watt generator (shown above).

Powerful magnets—some of the most powerful in the world—are available to researchers at the National High Magnetic Field Laboratory-Pulsed Field Facility (NHMFL-PFF). The mag lab is the only pulsed high field user facility in the country and a center for exceptional condensed matter physics research. By studying materials under extreme magnetic field conditions, NHMFL-PFF scientists make essential contributions to fundamental materials science, energy research, and stewardship of the nation's nuclear stockpile.

Powering these magnets is a 1.4-billion-watt generator system capable of producing a pulse of electrical energy equivalent to greater than 200 sticks of dynamite. The generator system, which has operated at the magnet lab since the early 1990s, recently underwent repairs and improvements that are one part of a multiyear modernization project to ensure the facility delivers on its fundamental and national security science missions for decades to come.

"The success of the repairs relied on coordinated work with strong emphasis on conduct of operations, safety, customer focus, and performance," said Michael Rabin, director of the Pulsed Field Facility. That success was demonstrated by a 91-tesla test pulse in January.

The recent work was a complex industrial and technical operation relying on staff from multiple Laboratory organizations with expertise in industrial hygiene; facility operations; acquisition services; environment, safety, and health; packaging and trans-

continued on next page

Josiah Srock (NHMFL-PFF) (center) examines a pump coupling to be installed by APM (a division of GE) millwrights Stewart Irving (left), Miguel Herrera (right), and superintendent Mark Cole (not pictured).

GE millwright Harry Sims cleans excitation brush rigging to prepare for collector ring grinding as part of the generator system's mechanical upgrade.

Lockout-tagout, a safety procedure designed to ensure energized systems are disabled during maintenance, is a key element of the generator modernization project. Each worker on the job individually places a lock to ensure all systems stay deenergized during the operation.

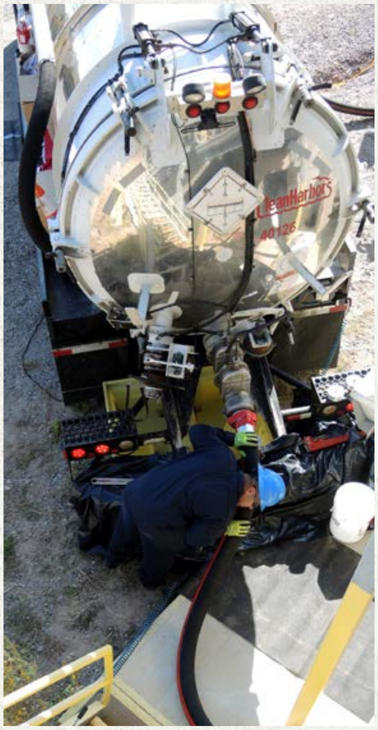
Mag lab continued ...

portation; asbestos abatement; lifting and rigging; and training, who seamlessly collaborated with subcontractors from General Electric (GE), ASEA Brown Boveri, and Clean Harbors.

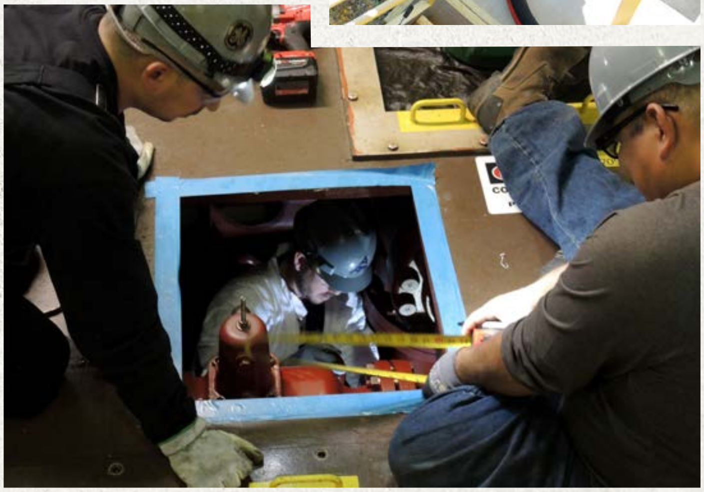
The overall modernization project will enable the machine to deliver the power needed to stay atop a highly competitive international arena, according to Jon Betts, leader of the mag lab power team. The NHMFL-PFF "operates an international user program for research in high magnetic fields and has the world's only research program that has delivered scientific results in nondestructive magnetic fields up to and exceeding 100 tesla," he said. The generator will now deliver more consistent and reliable power to the facility's long-pulse 60-tesla magnets and flagship 100-tesla multi-shot magnet and will benefit research performed as part of the mag lab's user program, the DOE Basic Energy Sciences program, and the Laboratory Directed Research and Development program.

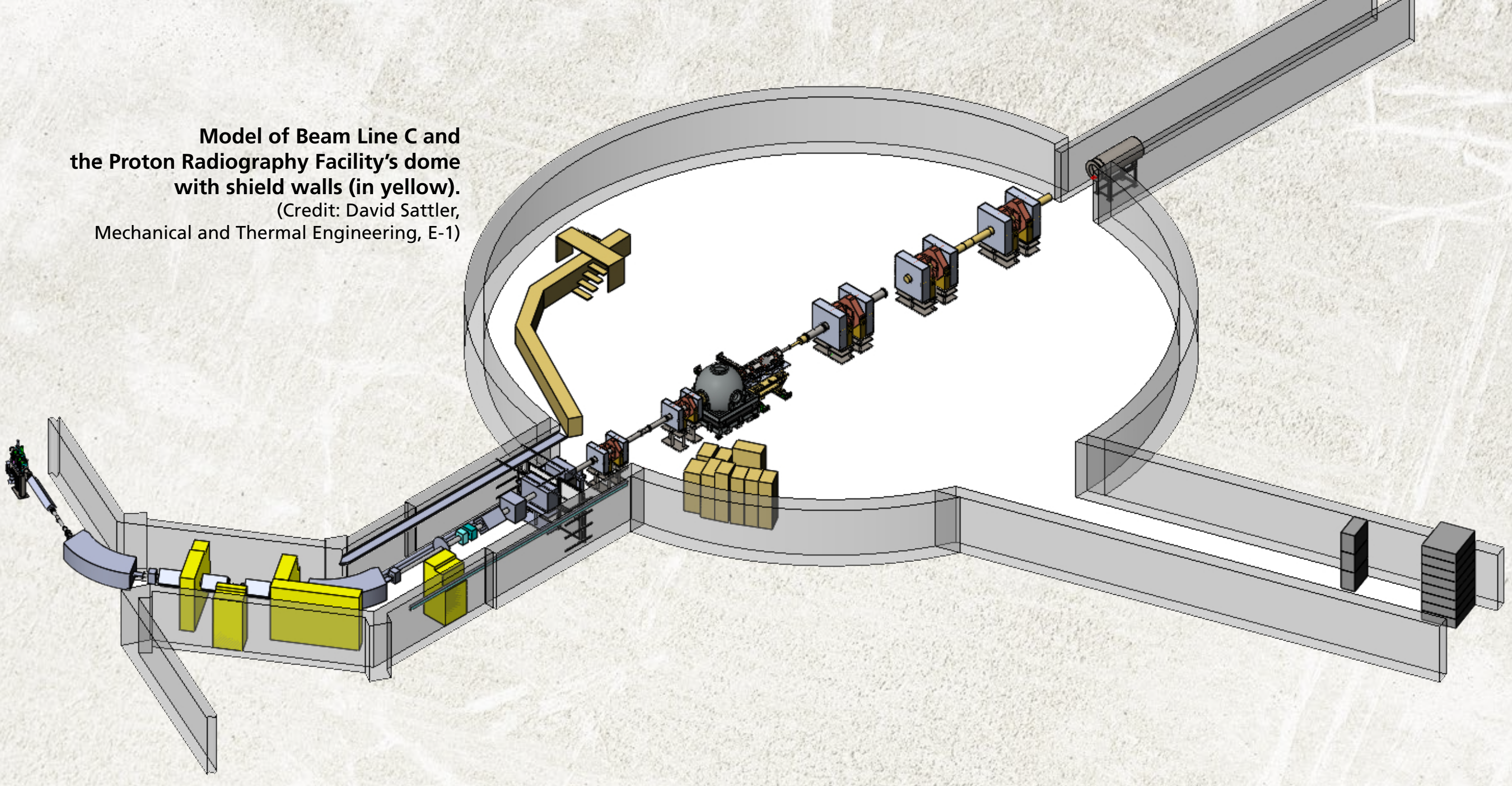
In the project's first phase, a specialized team refurbished the generator's 40-inch chromium-vanadium rings, part of the electrical interface that delivers power from the generator to magnets used for science experiments. This involved deenergizing the drive, setting up a lockout-tagout of the machine, and abating asbestos-loaded gaskets. GE personnel then ground and polished the rings for almost three days. Because the machine was on and gears were turning during polishing, engineers from Los Alamos and GE had to closely supervise the polishing before reassembly. In the fall of 2018, technicians from GE and Clean Harbors worked with magnet lab staff to service the generator's sophisticated oil lubrication system. The team drained the 26,000-gallon oil tank—storing the oil onsite for eventual reuse—abated asbestos gaskets, visually inspected the pumps within the tight confines of the tank, and shipped a pressure control device for offsite repairs. The team quickly returned to reinstall the components and test the system, completing this phase shortly before the Lab's winter closure. The next phase involves ASEA Brown Boveri members engineering and manufacturing electrical components central to the generator's power delivery capabilities. These components are state-of-the-art versions of the exciter and driver systems that the machine has used since it was commissioned almost 30 years ago.

The NHMFL-PFF is one of three campuses of the nation's premier institution for high magnetic field science, which is sponsored primarily by the National Science Foundation, Division of Materials Research, with additional support from the State of Florida and the U.S. Department of Energy. The Los Alamos mag lab power system upgrade project is funded through the Lab's institutional support via the Operations Infrastructure Program Office.



Above: Lab and GE employees use a crane to move a 1,500-lb. auxiliary lubrication oil pump. Right: Servicing the oil tank required draining 26,000 gallons of oil, which was kept in reserve and reused at the completion of the project. Below: GE personnel conducting measurements, cleaning, and performing a mechanical inspection inside the lubrication oil tank. To enter the oil tank, subcontractors had to be trained in the Laboratory's confined space practices.





Model of Beam Line C and the Proton Radiography Facility's dome with shield walls (in yellow).
(Credit: David Sattler, Mechanical and Thermal Engineering, E-1)

Shield wall installation makes the most of the LANSCE run cycle

A proton radiography experiment at the Los Alamos Neutron Science Center (LANSCE) is a complicated affair. The "shot" itself—when a high-energy proton beam is used to image the internal properties and behavior of materials subjected to violent forces—takes only a few minutes of accelerator beam time. However, its setup requires days of finely finessed details by Laboratory staff working in the dome of the Proton Radiography Facility (pRad).

For years, this meant that for workers to safely inhabit the dome while preparing a proton radiography experiment, the accelerator beam had to be switched off to both lines B and C. These lines simultaneously deliver protons to pRad and its neighbor, the Ultracold Neutron Facility.

The Ultracold Neutron Facility provides researchers with the world's highest density source of ultracold neutrons used in studies aimed at developing a better understanding of the nature of the universe.

> "The Line C shield wall project has the potential to increase the usage of the available proton beam by up to 10%."

Now, thanks to an operational improvement that relied on the expertise of workers from across the Laboratory, pRad staff can set up and take down experiments while ultracold neutron researchers collect data. Operation of the large accelerator complex, funded by the National Nuclear Security Administration, is a costly endeavor. The Line C shield wall project has the potential to increase the usage of the available proton beam by up to 10%.

"The ability to run in parallel with pRad is a great step forward for the fundamental physics studied at the Ultracold Neutron Facility," said Subatomic Physics (P-25) Deputy Group Leader Mark Makela. The experiments at the facility measure properties of the neutron that are used to predict the evolution of the universe. "These experiments require a lot of data to be statistically significant. The new shield walls increase the amount of data we can take in a given run cycle," he said.

Before the addition of the new shield walls, Lab scientists had to return to work after hours to perform experiments while data arrived, according to Makela. Now, neutron team members, other Lab scientists, and technical staff can work on problems during the daytime, leading "to increased experiment uptime and higher data quality," he said.

The improvement, years in the making, required coordination across organizations including Accelerator Operations and Technology, Physics, Project Integration, Safety Basis, and Logistics divisions. Contributing to the complex effort were engineers; designers; technicians; physicists; construction managers; craft workers, including riggers, laborers, electricians, and pipe fitters; and Laboratory management.

"Teamwork and responsiveness to project schedules were essential to complete this work within the allocated accelerator outage," said Project Engineer/Manager Walter Barkley (Mechanical Design Engineering, AOT-MDE).

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> **"Teamwork and responsiveness to project schedules were essential to complete this work within the allocated accelerator outage."**
>
> ***Walter Barkley (AOT-MDE)***

Shield wall continued ...

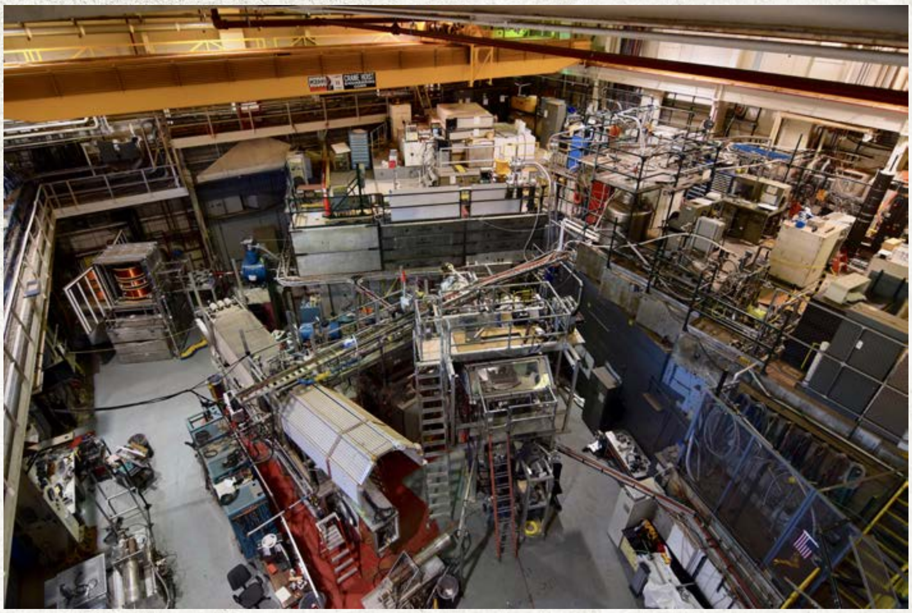
CAD designs were developed that provided detailed drawings of the project. A radiation analysis was performed, determining that should a beam spill occur levels could be reduced to below the threshold limit specified by radiation protection guidelines. Shield walls of custom-poured concrete and steel that could easily be reconfigured to accommodate maintenance in the Line C tunnel were designed, fabricated, and installed.

Accelerator components were improved—such as the installation of independent, redundant beam plugs that serve as interlock switches for beam operation and controls that limit personnel access during beam operations. In the process, pRad received a modern beam position monitor that improves accuracy during experiments.

"Significant personnel safety system changes in the radiation security system were required, including a relocation of the personnel access control system boundary, installation of a dual beam plug assembly, and a change in the operating modes of the LANSCE accelerator," said Protective Systems Team Leader Everett Espinoza (Accelerator Operations, AOT-OPS).

The entire design and plan were based on requirements contained in the TA-53 Prompt Radiation Protection Shielding Policy and were reviewed and approved by the Radiation Safety Committee at LANSCE. The committee ensured the design improvement met the requirements in LANSCE safety basis documentation, thus meeting DOE requirements for the radiological safety of an accelerator facility.

Above: The Proton Radiography Facility. Below: The Ultracold Neutron Facility.



Far right: A shield wall with bending magnet (in blue). Right: The new dual beam plug, part of the radiation safety system.

Multiyear strategy leads to dramatic cleanup of the LANSCE mesa

During the four decades of the Los Alamos Neutron Science Center's (LANSCE) service to the nation, thousands of tons of shielding and other programmatic equipment have accumulated on the mesa. Much of the material was used shielding stored informally and intended for quick-turnaround use during the accelerator's run cycle. Such shielding is part of the safety system that protects workers and equipment from radiation exposure during the accelerator's operation. Unneeded magnets were stored for years until a release process was developed for potentially activated metal, ensuring safe release for recycling.

Now, the results of a dramatic shift in this mode of operation can be seen across the 751-acre technical area. Recognizing that the regulatory environment has changed and spurred by a desire to protect the mesa's cultural, biological, and water resources, Laboratory staff developed and are implementing a multiyear cleanup strategy. Their efforts have not only reduced the Lab's environmental risk, but have also improved operational efficiency and addressed housekeeping and workplace stewardship.

> "Having materials consolidated gives us more pride in our workplace, saves us money, and reduces our environmental risk, which allows us to continue doing our work with less interruption."
>
> *Courtney Perkins (DESH-LFO)*

Experts in facility operations and maintenance across the LANSCE mesa are building environmentally protective shielding storage areas with access restrictions and inventory controls, consolidating shielding to controlled storage areas, and recycling legacy metal shielding and equipment.

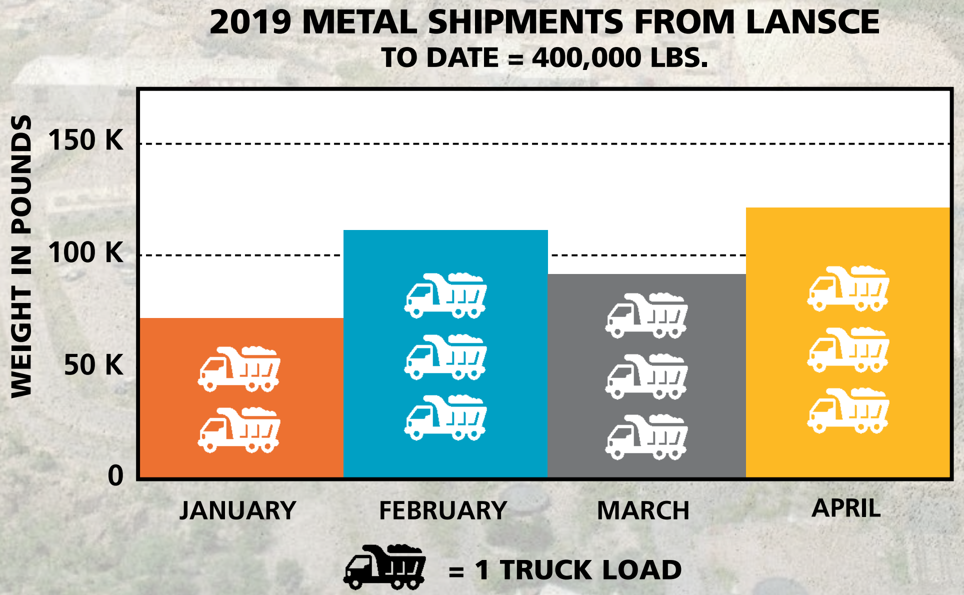
"Having materials consolidated gives us more pride in our workplace, saves us money, and reduces our environmental risk, which allows us to continue doing our work with less interruption," said Courtney Perkins, deployed environmental professional (Deployed ESH-LANSCE Facility Operations, DESH-LFO).

Future plans involve additional consolidation and disposition of other items around the mesa, including continuing to ship for recycling the metal that has been cleared through a stringent release process.

Essential to this effort have been staff and programs from across the Laboratory, including the Site Cleanup and Workplace Stewardship Program (ALDFO), Environmental Stewardship (EPC-ES), Accelerator Operations and Technology (AOT), LANSCE Facility Operations (LANSCE-FO), DESH-LFO, Maintenance and Site Services (MSS-LFO), and Logistics (LOG).

Projects supporting the release and recycle of potentially activated metal and metal consolidation have been funded through the Site Cleanup and Workplace Stewardship Program with funding from NA-532, Office of Nuclear Material Integration.

Other cleanup projects have been funded with institutional site support through the Site Cleanup and Workplace Stewardship Program and LANSCE Facility Operations. AOT's forklift support has been crucial to keeping project costs low and enabling much of the work to be accomplished.



Metal recycling

Left: Radiological control technicians Diana Garcia (far left) and Kiko Rael (both DESH-LFO) perform a rigorous radiological screening of large pieces of metal shield ing, equipment components, magnets before the material is released to a subcontractor for recycling (above).

Shielding consolidation

Left: A few years ago the hand-stack shielding was scattered on the mesa near a cultural site. Funding for the cleanup project provided metal crates and laborer support to pack the shielding into the crates. Right: Shown is the area after the shielding was moved to an old lagoon for storage, opening up space and addressing housekeeping issues. Cranes were required to move the crated blocks to a consolidated area where they are available for future reuse.

Controlled storage

Above: Rubble and debris had been allowed to accumulate from maintenance and construction projects. Above far right: The piles were removed and now provide a controlled area for storage of shielding and staging of metal to be released for recycle. Right: Former lagoons have been cleared and graded and serve as an access-controlled storage space for shielding. An inventory allows researchers to efficiently locate shielding that best suits their needs. Since the start of the cleanup more than 600 pieces of metal shielding have been moved to controlled storage areas.

Ultracold Neutron Facility cryocooler boosts operational safety, data collection consistency

Laboratory staff recently installed a new cryocooling system in the Ultracold Neutron Facility that improves both operational safety and consistency in data collection for researchers studying the neutron lifetime and possible links to dark matter (see story below).

The system is used to cool a high-purity germanium (HpGe) gamma-ray detector used in a variety of experiments aimed at understanding the fundamental nature of ultracold neutrons, subatomic particles that when cooled move so slowly they can be "trapped" and measured.

HpGe detectors are operated at low temperatures, approximately 85–100 K. To maintain this temperature, ultracold neutron researchers were previously pouring liquid nitrogen from portable containers daily (shown at right), which required cryogenic training and considerable personal protective equipment. The system's location is such that this process required standing on a platform and could necessitate pouring the liquid nitrogen from overhead.

The need for the cryocooler was identified during a Management Observation and Verification (MOV). MOVs provide a mechanism to facilitate open and honest communication between managers and workers and enable managers to continuously improve their organizations. Los Alamos Neutron Science Center (LANSCE) management provided funds to purchase the cryocooler.

In addition to improving safety conditions, the system will also help experimental setup at the Ultracold Neutron Facility by automating cooling. Previously, if the system ran out of liquid nitrogen the detector required several days to return to the optimal temperature, halting data collection. Experiments using HpGe detectors, like the dark matter experiment, can collect data for months at a time, so automated cooling lifts a significant experimental burden.

Deion Fellers (Subatomic Physics, P-25) manually fills the HpGe detector for the ongoing dark matter experiment.

This work is an improvement to the facility, which uses high-energy spallation neutrons produced by protons from the LANSCE

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Using the high-purity germanium gamma-ray detector to investigate neutron lifetime

In experiments measuring the lifetime of a neutron, scientists have come up with two different answers depending on the experimental method used. One set of experiments measured the rate at which a beam of ultracold neutrons decayed into protons. The other set, including an experiment performed at Los Alamos, measured the loss rate of neutrons trapped in a magnetic bottle. Any time there are neutrons, some will be captured as they interact with different types of matter—like the sides of the container in which they are held. This neutron capture event produces a gamma ray with a known energy spectrum. By analyzing the energy spectrum of the emitted gamma rays, researchers can monitor the number of ultracold neutrons trapped in the container.

As one possible explanation for the difference in neutron lifetime measured by the two techniques, scientists have postulat ed a few decay modes by which neutrons decay into dark matter rather than into protons. Each of these modes would emit a gamma ray with a different energy signature. The cryocooled high-purity germanium gamma-ray detector will help test this theory.

The same experimental setting with the cryocooler installed.

UCN cryocooler continued …

linear accelerator interacting with a target and uses solid deuterium to cool the neutrons. It is the first ultracold neutron source based on superthermal ultracold neutron production and the only operational source of ultracold neutrons in the United States.

The work supports the Laboratory's ongoing efforts to improve safety and its fundamental science mission area by aiding the search for dark matter and developing capabilities and expertise essential to its national security science mission.

Researchers who contributed to the cryocooler's installation include Christopher Morris, Zhaowen Tang, Chris Cude-Woods, Deion Fellers, Jeff Bacon, Bill Louis, Mark Makela, and Melynda Brooks (all Subatomic Physics, P-25).

MEET DEEANN CHAVEZ

Technical project manager, Nuclear Materials Science (MST-16)

As a member of Nuclear Materials Science (MST-16), DeeAnn Chavez coordinates complex projects supporting the Lab's mission. She recently wrapped up a complicated project that was years in the making: disposing of 10 years' worth of accumulated legacy waste—mainly plutonium and uranium—for the group.

"MST-16 is the end of the line in terms of materials processing and we were approaching maximum capacity, which made this a really important project for the Laboratory," Chavez said.

Her role was to manage the removal of the waste—securing funding, supporting technicians as they identified and organized samples, collaborating with program managers, and overseeing sample oxidization and eventual disposal. In total, her team safely removed 1.6 kilograms' worth of small samples from PF-4, the Lab's central plutonium facility.

Chavez also secured funding for modernizing MST-16's gloveboxes. Los Alamos is the nation's Plutonium R&D Center of Excellence, tasked with producing 30 plutonium pits per year. Recently, the U.S. government asked the Lab to expand pit production with a "surge" capability. MST-16 is rising to that challenge by updating its existing gloveboxes to process plutonium.

Currently she is supporting the Lab's Pit Surveillance and Plutonium Sustainment programs by assisting in the development and integration of the programs' overall project schedules.

"Operations is where the rubber meets the road. It takes a lot of coordination and effort to get work done," especially at her technical area, Chavez said. "Fortunately, I work with amazing people who take pride in their work, do whatever it takes to get the job done, and strive to meet the Lab's mission."

Technician Gary Sanchez (AOT-RFE) catalogs a magnet power supply, one of hundreds of such devices kept in inventory in order to keep the Los Alamos Neutron Science Center accelera tor operating efficiently.
(Photo by Daniel Owen, Technology Services and Solutions, XIT-TSS)

Powering sure and steady operations through preventive maintenance

To keep the 800-MeV linear accelerator (linac) humming along in its support of national security science at the Los Alamos Neutron Science Center, members of Accelerator Operations and Technology Division (AOT) perform thousands of preventive maintenance activities each year in support of the annual operational period.

The preventive maintenance touches upon all aspects of the accelerator's operation—from the linac and beam line components, its vacuum and cooling water systems, and the linac control system's hardware and software to its target and interlock systems, ion sources and injector systems, and its numerous high-power systems. This service requires the skills of technicians, engineers, and scientists who work along the entire length of the half-mile-long accelerator.

For example, the Magnet Power Supply team in RF Engineering (AOT-RFE) includes engineers and technicians that are highly trained as energized electrical workers. Their maintenance activities range from replacing wall-plug, hand-held 600-watt power supplies to repairing massive 600,000-watt DC power supplies that are fed directly from facility power.

AOT maintains more than 600 individual active power supplies, shunts, and pulsed power devices, as well as hundreds more that are inactive or spares. The result is sort of an "accelerator parts supply store" that allows technicians to quickly swap out a failed device for one ready to go "off the shelf." This mitigates accelerator downtime during the run cycle and allows technicians and engineers ample opportunity to diagnose and repair the component without halting operations. Each power supply is identified with a QR code that can be scanned and logged into the thousand-plus-entry database that tracks its location, service record, electrical hazard classification, and use in the accelerator.

The goal for this system is to maintain an inventory of at least 10% spares, according to Team Leader William Roybal (AOT-RFE). The system allows for quick equipment swaps to address failures and thus improves efficiency. Team members can then develop their skills on component-level repairs offline without impacting accelerator operations.

Time-sensitive chemical monitoring aids safety and disposal challenges

Chemicals are sometimes like condiments—how long they last can depend on how they are used and stored. Noting a chemical's expiration date is one way to monitor shelf life; however, periodically testing the chemical may also be necessary. For time-sensitive chemicals this is particularly true.

For example, even if tetrahydrofuran (THF), a solvent commonly used in synthetic chemistry and polymer processing, is used and stored properly, exposure to air can cause the chemical to form peroxide. Over time this autoxidation reaction can produce high levels of peroxide, which can then precipitate, forming shock-sensitive crystals.

In 2017, Los Alamos staff were preparing unused and unspent chemicals for disposal, when an employee noted crystals in a bottle of THF. Emergency notifications were made, the building was evacuated, and the Laboratory hazmat team quickly arrived to inspect the bottle. To safely dispose of the chemical and bottle and after receiving approval from the New Mexico Environment Department, they destroyed it in a total containment vessel—a dramatic but necessary means of disposal for a chemical that had become hazardous.

Following this event, to ensure chemical safety, members of Materials Science and Technology Division (MST) developed a guide based on one developed by Chemistry Division. Based on the guide, chemical owners receive email reminders to test their chemicals every six months. The guide outlines methods for testing and instructions for updating the Laboratory's chemical inventory database.

Implemented in the spring of 2018, the guide has helped ensure MST's time-sensitive chemicals have been tested. In the most recent round, all chemical owners promptly evaluated their chemicals. In fact, during testing in late 2018, one bottle of THF was found to have increased peroxide levels. As the development was identified promptly, when Laboratory hazmat teams inspected the bottle they found no crystals had formed and were able to neutralize and dispose of the THF through conventional waste streams. This work supports the Laboratory's commitments to safety and appropriate waste management.

Matthew Chancey (Materials Science in Radiation and Dynamics Extremes, MST-8) tests isopropanol for changes that would indicate it has formed hazardous crystals upon being exposed to light or air. The solvent evaporates quickly, making it useful for cleaning vacuum components used at the Ion Beam Materials Laboratory.

(Photo by Kevin Sutton, Technology Services and Solutions, XIT-TSS)

CATCHING

FIRE

Manufacturing safety video captures what happens when depleted uranium ignites

In a safety and educational demonstration by Sigma Division researchers, a pile of depleted uranium shavings slowly burns in a concrete container.

Working with depleted uranium (DU) is an important part of the Laboratory's national security mission. At the Sigma Facility, one of the only places in the nation with a uranium foundry and the manufacturing capability to safely work with DU, technicians routinely cut the material into pieces that are eventually cast into vital components for a variety of uses.

On rare occasions, a buildup of DU chips may be ignited by a spark from the saw blade, causing a small fire.

What happens next turns out to be more fizzle than sizzle.

The small fire typically extinguishes itself, and out of an abundance of caution operators keep graphite power and coolant nearby to quickly extinguish any embers.

"People typically imagine large-scale violent reactions when they hear the words 'uranium chip fire' even though the reality of the situations that we typically encounter within Sigma are much different," said Casey Shoemaker, a member of the Foundry and Solidification Science team in Fabrication Manufacturing Science (Sigma-1).

As a training aid to help others better understand the hazards encountered during a DU chip fire, Sigma Division developed a video that shows the effectiveness of its safety precautions. The demonstration is part of an effort to assure regulators and local responders that these "unexpected events" are often less severe than they appear.

In the video, a Sigma researcher ignites a DU sample that is 100 times larger than typically encountered during normal operations. Orange embers work their way through the material for a few seconds until the fire quickly and easily fizzles out.

"Although we always strive to minimize the potential for any fire and have mitigation measures in place to prevent them from occurring, occasionally they will happen," Shoemaker said. "When they do, we are prepared to manage them safely and effectively."

In a still from the safety video, Garry Sandoval (Sigma-1) uses a band saw fitted with a special blade to cut depleted uranium that will eventually be cast into vital components.

In the video, Casey Shoemaker (Sigma-1) ignites a pile of depleted uranium shavings. As part of the demonstration, she also extinguishes the embers using graphite powder. Although such a fire is a rare event due to the mitigation measures in place, they do occasionally occur. The video demonstrates the safe and effective methods incorporated into the pre-job planning processes of operations at the Sigma Facility.

7 The number of Los Alamos Employees' Scholarship Fund students in ALDPS in 2018

Giving campaign kicks off May 13.

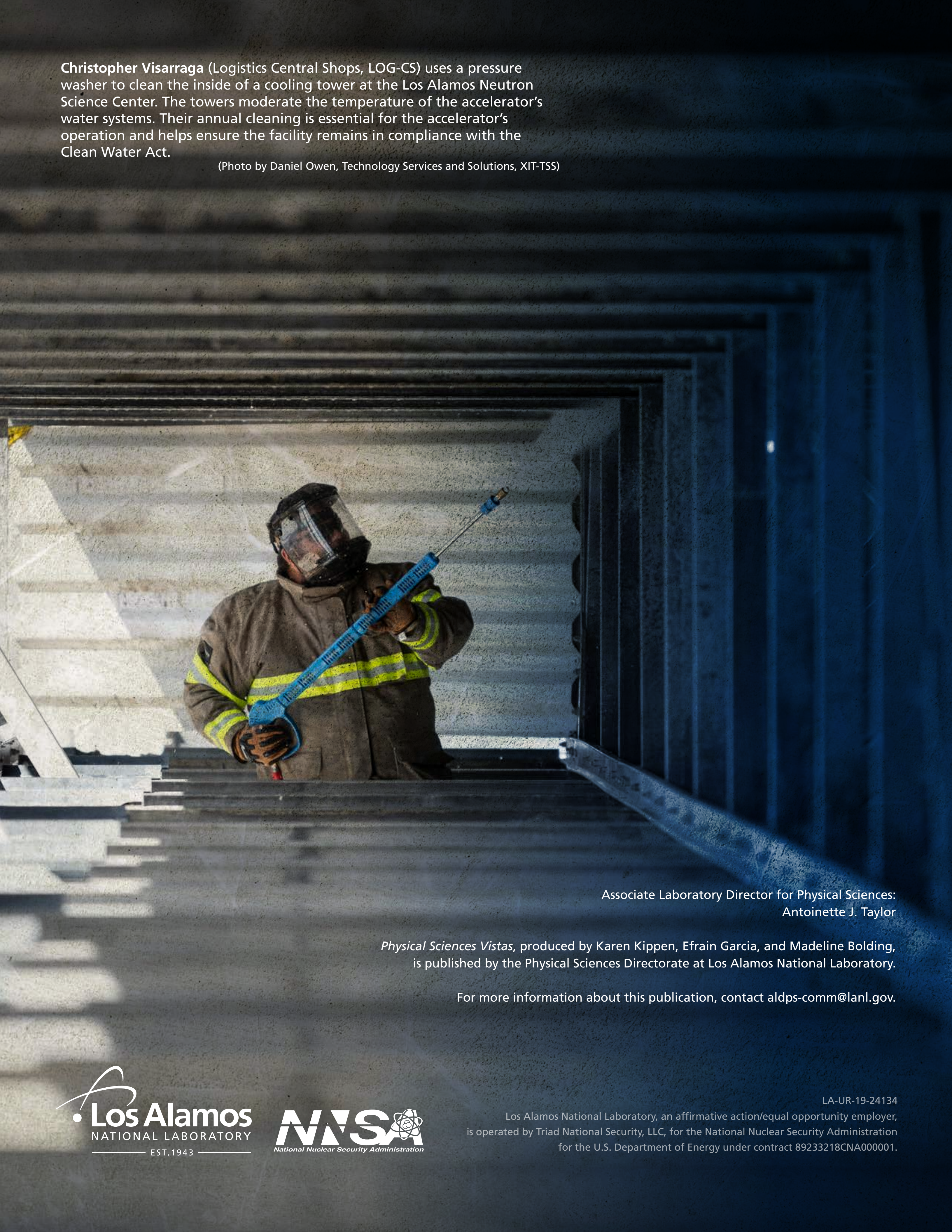
2018 SCHOLARSHIP RECIPIENTS BY COUNTY

1 in 3 students who applied received a scholarship.

- San Miguel — 2 students, $15,000
- Mora — 4 students, $40,000
- Sandoval — 5 students, $28,500
- Taos — 13 students, $87,250
- Los Alamos — 19 students, $108,000
- Rio Arriba — 20 students, $88,450
- Santa Fe — 44 students, $292,000

The Los Alamos Employees' Scholarship Fund (LAESF) provides scholarships based on academic achievement and need to exceptional Northern New Mexico students pursuing undergraduate degrees in fields that will serve the region. These students represent the best and the brightest local talent and are an important part of our communities' future.

The LAESF internship program provides scholarship students with meaningful work experience that excites and challenges them, while developing a promising pipeline of next-generation Laboratory employees. Last year, ALDPS employed seven scholarship students.



Christopher Visarraga (Logistics Central Shops, LOG-CS) uses a pressure washer to clean the inside of a cooling tower at the Los Alamos Neutron Science Center. The towers moderate the temperature of the accelerator's water systems. Their annual cleaning is essential for the accelerator's operation and helps ensure the facility remains in compliance with the Clean Water Act.

(Photo by Daniel Owen, Technology Services and Solutions, XIT-TSS)

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