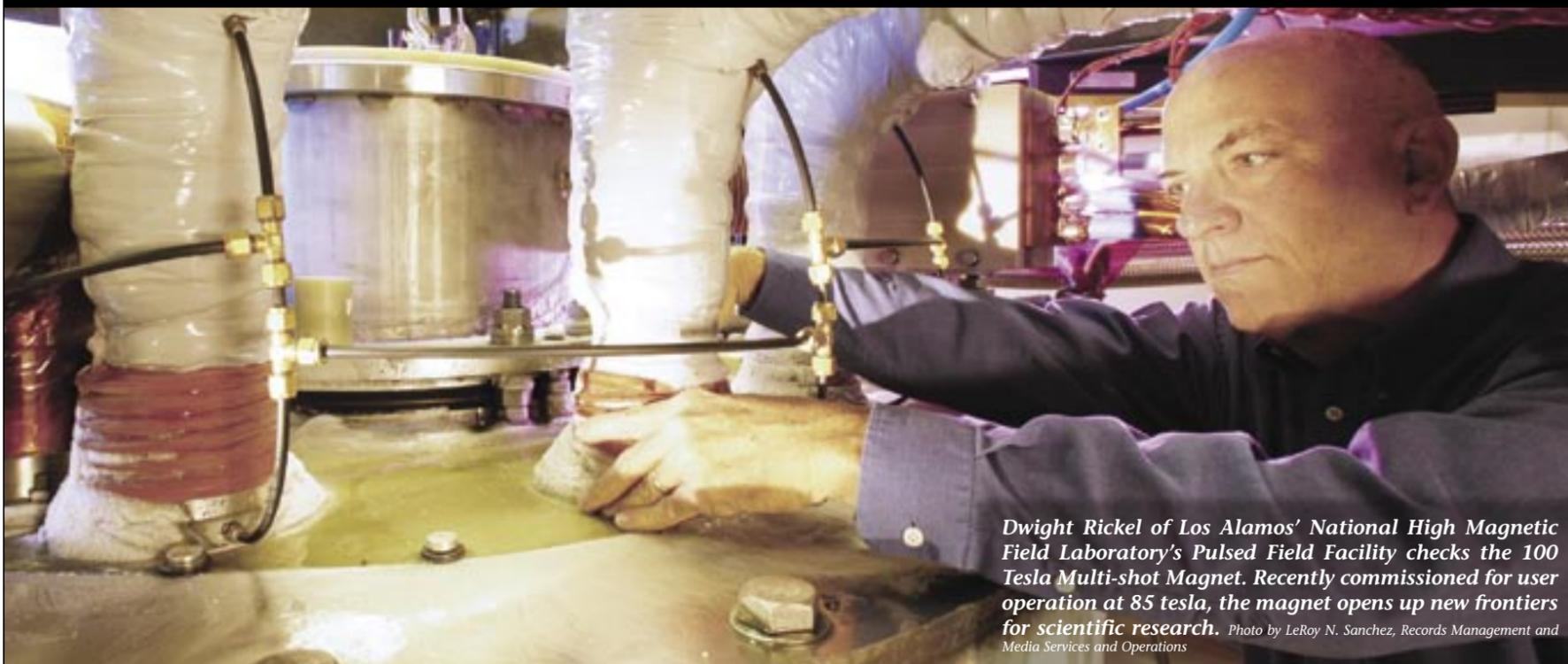


Powerful magnet expected to attract new users



Dwight Rickel of Los Alamos' National High Magnetic Field Laboratory's Pulsed Field Facility checks the 100 Tesla Multi-shot Magnet. Recently commissioned for user operation at 85 tesla, the magnet opens up new frontiers for scientific research. Photo by LeRoy N. Sanchez, Records Management and Media Services and Operations

by Hildi T. Kelsey

From the geomagnetic fields that point a compass north to the magnets used in headphones and motors, magnetic fields are all around us. Despite their ubiquity, however, the closest that most people ever come to truly powerful magnetic fields are those generated by magnetic resonance imaging machines or MRI.

Magnets used in MRI machines produce magnetic fields in the one-half to two tesla range. However, scientists from around the globe will soon be drawn to Los Alamos to the National High Magnetic Field Laboratory's Pulsed Field Facility and its recently commissioned 100 Tesla Multi-shot Magnet. At 100 tesla, the new magnet's field is 200,000 times stronger than Earth's magnetic field. This powerful magnetic field source will help scientists open up new frontiers for materials research, such as the basic electronic energy balance in electronic materials. What they find could help produce the next generation computers, sensors and much more.

A tesla is a unit of magnetic flux density, or the strength of a magnetic field in a given region, named for 19th-century electrical engineer Nicola Tesla.

The magnet's commissioning comes after 10 years of research, instrument development, and construction. Easily capable of reaching 100 tesla, the new magnet has already been pushed to 87.8 tesla on one occasion and has exceeded 85 tesla several other times. Over time, it will be used at higher fields, depending upon materials development needs and consistent with user demand. The previous world record for magnetic field strength was 82 tesla.

"Achieving fields above 85 tesla nondestructively and repetitively marks a major milestone in magnet design and materials engineering as man-made fields of this strength have never before been produced without the use of highly destructive, explosives-driven, magnetic field-generating technologies," said Alex Lacerda, Los Alamos' National High Magnetic Field Laboratory (MPA-NHMFL) leader.

The magnet is now part of the NHMFL's User's Program. The NHMFL is jointly supported by the Department of Energy's Office of Basic Energy Sciences and the National Science Foundation. Scientists and engineers from academia, government laboratories, and industry have access to the NHMFL's various magnets on a competitive basis.

With this new capability, researchers can explore uncharted regimes of low temperature and high magnetic field, central to understanding the mechanism of superconductivity, magnetic field-induced phase transitions, and so-called quantum critical points, in which small changes in materials properties at very low temperature have dramatic effects on physical behavior.

One-hundred tesla also provides a three nanometer length scale, comparable in size to some of the smallest nanostructures or even moderately-sized organic molecules, vastly expanding scientists' ability to probe, study, and predict the properties of the increasingly-complex organic molecules used for health, science, and research. Such a "magnetic microscope" will be of increasing importance to the burgeoning field of nanoscience providing hot topics for several years to come.

Finally, 100-tesla magnetic fields will enable studies of new alloys never before possible at the quantum limit, where such studies may help to reveal the theories needed to design from scratch new high-strength, lightweight, superconducting, and chemically resistant metals.

"The NHMFL 100-Tesla Project is an excellent example of teamwork among scientists, engineers, and government agencies. [One hundred tesla] has been a goal for many years world-wide," said Lacerda. "The scientific environment at Los Alamos was of paramount importance in this achievement. I'm also particularly pleased by the continuing support from DOE and NSF to this long and exciting project."

The NHMFL develops and operates state-of-the-art, high-magnetic-field facilities that faculty and visiting scientists and engineers use for research in physics, biology, bioengineering, chemistry, geochemistry, biochemistry and materials science. The laboratory — with campuses in Tallahassee and Gainesville, Florida, as well as in Los Alamos — is sponsored by the NSF and the state of Florida. It is the only facility of its kind in the United States.

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For Your Safety



Photos by Maryrose Montalvo, Plutonium Manufacturing and Technology

Temporary barriers can protect co-workers

While moving a waste drum to load on a truck for shipment to Technical Areas 54 or 55, Richard Martinez of the Chemistry and Metallurgy Research Division (CMR-DO) observed that employees would cross through the loading dock area without wearing proper personal protective equipment, creating a potential for injuries or radiation exposure.

Acting on this observation, Stockpile Manufacturing and Support (SMS) Division's ATOMICS Safety Office facilitated a low-cost solution that protects both the employees loading drums and prevents other workers from entering an area without the precautions spelled out in integrated work documents for this type of procedure. The barriers utilize magnets, bungee cords, and caution signs and are readily portable as the shipments move from site to site.

Plutonium Manufacturing and Technology (PMT) Division Leader Stephen Yarbrow provided funds for the material needed to create the safe work area.



DOE Office of Science chief at Los Alamos

Laboratory Director Mike Anastasio, left, shares a laugh with Department of Energy Office of Science Director Raymond Orbach, who was at the Laboratory for briefings on several programs. He also toured the Dual Axis Radiographic Hydrodynamic Test facility at Technical Area 15, and witnessed computer modeling and simulation demonstrations in the Nicholas Metropolis Center for Modeling and Simulation at TA-3. Orbach is a former chancellor of the University of California, Riverside. UC is one of the partners of Los Alamos National Security, LLC, which operates the Laboratory. Photo by LeRoy N. Sanchez, Records Management and Media Services and Operations

Los Alamos National Laboratory NewsLetter

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Los Alamos National Laboratory is a multidisciplinary research institution engaged in strategic science on behalf of national security. The Laboratory is operated by a team composed of Bechtel National, the University of California, BWX Technologies and Washington Group International for the Department of Energy's National Nuclear Security Administration.

Los Alamos enhances national security by ensuring the safety and reliability of the U.S. nuclear stockpile, developing technologies to reduce threats from weapons of mass destruction, and solving problems related to energy, environment, infrastructure, health and global security concerns.



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Agreements reaffirm Lab-DOE partnership with nearby pueblos

Santa Clara Pueblo Gov. Michael Chavarria, left, along with Jemez Pueblo Gov. Roger Madalena and Cochiti Pueblo Gov. Cippy Crazyhorse, far right, signed documents extending accord agreements in place between the pueblos and the Department of Energy during the 21st cooperative agreement executive meeting at the National Security Sciences Building at Technical Area 3. The Laboratory also has cooperative agreements in place with the four nearby pueblos — San Ildefonso Pueblo Gov. James Mountain also attended. The agreements cover issues of mutual concern, including education, environment, transportation, and emergency response. Deputy Director John Mitchell represented the Laboratory. The meeting was coordinated by the Tribal Relations Team in Los Alamos' Government Affairs Office. Photo by Sandra Valdez, Records Management and Media Services and Operations



Q: Weather professionals are predicting that Northern New Mexico may have a wetter winter this year than last, which is good news to winter sports enthusiasts. Do you ski, skate, snow shoe, or regularly take part in any outdoor winter activity? If so, what do you do, if anything, to physically prepare for your sport?



Curt Bronkhorst of Fluid Dynamics (T-3)

I skate and hope to take up skiing (again) this winter. I try to run two to three times per week.



Cynthia Castain of Financial and Personnel Applications (IST-APPS1)

We cross-country ski and sometimes snow shoe, and we try to stretch and strengthen our muscles in preparation for those activities.



Camillo Disalle of Enterprise Support and Computer Education (CT-ESCE)

I ski and I make sure that I am stretched out and limber. I also make sure to have contact numbers, emergency numbers, and a map of the area that I am in. Most of all I just try to be ready to take on the task.



John Rhoades of the Community Programs Office (CPO)

Winter for me, is just a prelude to spring and summer. Lots of snow means good whitewater boating and a chance that our hiking trails won't be closed next summer during the fire season. Mostly I spend my winter as a couch potato and psych myself up in February to burn off winter fat for the snow melt.

Green Primaries wins national award

My Hang Huynh of Dynamic and Energetic Materials (DE-2) and her team won a National Registry of Environmental Professionals (NREP) Environmental Award in the Health and Safety category for the invention of Green Primaries — novel, nontoxic, explosive chemical compounds designed to replace lead-based primary explosives. A representative from NREP presented the honor to Huynh during the organization's 2006 annual conference in Nashville, Tennessee.

"It was a pleasurable surprise when I saw an e-mail from Paul Waters [of NREP] regarding an award in the Health and Safety category for LANL green primary explosives," said Huynh. "After the international R&D 100 award of 2006, I am very pleased that our green primary explosive team is now recognized nationally. It is wonderful that this invention has again given the Laboratory very positive publicity."

In addition to being more environmentally friendly (no heavy-metal and toxic metal residues), Green Primaries are safer to manufacture, as they are completely insensitive to spark and their other sensitivities can be controlled. Consequently, they also are safer to handle and transport. Owing to different coordination environments, they can be produced in several variants. Used in ammunition and other initiation devices, they offer environmental benefits over their mercury or lead-based counterparts such as no lead contamination, no human lead exposure, no hazardous waste from the manufacturing process, and no risk of accidentally setting off sensitive primary explosives.



Photo by LeRoy N. Sanchez, Records Management and Media Services and Operations

My Hang Huynh

The Green Primaries project was completed in December 2005 after several years of work.

NREP's recognition of Huynh and her research underscores its self-defined mission "to promote legal and professional recognition of individuals possessing education, training, and experience as environmental managers, engineers, technologists, scientists, and technicians — and to consolidate that recognition into one centralized source."

Prestigious international award presented to Lab employees

Laboratory personnel working at the Nevada Test Site received the System Safety Award for Achievement in Scientific Research and Development for the work on the Joint U.S./U.K. Krakatau Subcritical Experiment.

Nick King of Neutron Science and Technology (P-23), **Dale Cain**, **Karl Hahn**, **Ross Oblad**, and **Art Villalobos** of the Nevada Operations Engineering (WT-9) contributed to the success of the team under the leadership of **Chuck Costa** of Weapons Engineering Technology (WT-DO), U.S. test director.

Working 1,000 feet below the NTS, the team executed an unprecedented and highly successful accident-free test consisting of high explosive and special nuclear material. The purpose of the test was to help assess the reliability of the nuclear weapons stockpile. The test collected more data and of unprecedented quality than any previous subcritical test at the Nevada Test Site.

Costa attributed Krakatau's success to the keen perseverance of multi-organizational teams — the Lab, Atomic Weapons Establishment, Sandia, Bechtel Nevada, and National Nuclear Security Administration — dedicated to "safety first," experiment objectives, and building on lessons learned. In addition to the System Safety award, the Krakatau team's scientific achievements have led to other award nominations, including from the NNSA.

In Memoriam

Lester Hackenberry

Laboratory retiree Lester Hackenberry died September 12. He was 85.

Hackenberry began working at the Laboratory in 1949 as deputy group leader in the former WX-10 group where he remained until his retirement in 1984.

Hackenberry was a World War II veteran. He graduated from Penn State University with a bachelor's degree in mechanical engineering.

He is survived by his wife, Vivian; brothers Donald of Wimberley, Texas, and Charles of Lancaster, Pa.; son Stephen, a Laboratory employee in Security System S-3 (SAFE-S3); daughter Leslie Vallejo of Pueblo, Colo.; six grandchildren; and five great grandchildren.



Annual Holiday Drive

The Laboratory's 2006 Holiday Drive to collect new toys and nonperishable food items for Northern New Mexico continues through December 8.

For more information, contact Tim Martinez of the Community Programs Office (CPO) at 7-2390.



An inspirational voice



Photo by LeRoy N. Sanchez, Records Management and Media Services and Operations

Melissa Porter

*'I feel a
responsibility
to inspire
positive feelings
in others
through my music.'*

by Erika Martinez

With her soft, melodic tones, Melissa Porter of Operations Support (EFO-OS) touches the heart of all who hear her sing. Whether she is offering a rendition of the national anthem at a Laboratory event or sharing her vocal gift during services at Holy Cross Church in Santa Cruz, Porter leaves listeners inspired, and she willingly shares her musical gifts with the Laboratory community, performing for many special events. Last spring, she serenaded former Laboratory Director Robert Kuckuck during his last all-employee meeting in May. "Singing for him at his final all hands was heartwarming and truly special," said Porter. "He is someone I respect very much for his genuine love of Laboratory employees, and it was difficult choosing a song that I felt would appropriately pay tribute to him."

Porter said she discovered her gift for singing at the early age of three, when her mother, Teresa Salazar, would take her along to choir practice. "Unbeknownst to my mother, I began to learn the songs," said Porter. When she was 17, she taught herself to play the guitar, and now says the guitar is a "dear friend."

Porter's love of music is to be expected. She comes from a long line of musical talent, and says her family was a major influence on her singing. "My mother's entire side of the family [Martinez] is very musical." My grandmother Manuelita's home was always filled with music, especially at Christmas time. "We sang every Christmas carol imaginable to the accompaniment of organ, guitar, accordion, and banjo music."

While her family inspired and nurtured her love of music, Porter took her talent to new heights outside the home. "Growing up, I joined every choir or singing group I could find, all the way through college," said Porter. She noted that her early musical style was influenced by some of the great female pop singers of the 1970s, such as Rita Coolidge, Linda Ronstadt, and Joan Baez. Her musical tastes tend to be eclectic. She sings country ballads, folk, Spanish, and classic soft rock. Her favorite vocal music, however, are religious hymns.

"There was a long time in my life when I was far away from the Lord. Music brought me back to him and has given me a chance to give him a little something in return," said Porter. In addition, she performs at community events such as fiestas and traditional religious celebrations, and notes that her singing has allowed her to meet and interact with many wonderful people, both in and outside the Lab. She fondly recalls when her co-workers in the former Tritium Science Engineering Group presented her with a new guitar. "I don't think they know how much each of them will always mean to me," she said.

Porter adds that music is a "powerful tool" that can affect both her life and the lives of others. "I feel a responsibility to inspire positive feelings in others through my music. Someday I would love to work with Tony Melendez, a musician born without arms who taught himself to play the guitar with his feet. He was once asked to sing for Pope John Paul II, and is such an inspiration to me," she said. "To overcome such a tremendous difficulty and still be able to find the gift in it just amazes me."

Although Porter is deeply dedicated to her music ministry, she admits that it is difficult to juggle work and family; she said the pressure is eased somewhat by having the support and unconditional love of her family.

Porter's first CD, "Te Amo," which she calls a "healing piece" for those who are hurting, is available at Cornerstone Music in Santa Fe. She currently is completing a new CD, due for release in December titled "I Long For You," which is filled with joyful songs of hope, as well as a rosary CD recently recorded with Father Pablo Straub of the Eternal Word Television Network. The rosary, which is recited in English and Spanish, will be released in the spring. Proceeds from both CDs primarily will go to assist Northern New Mexico youth, as well as Father Pablo's ministries, which assists the poorest of the poor in Mexico.