

Reporter

OAK RIDGE NATIONAL LABORATORY

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ORNL researchers continue quest to determine age of ancient obsidian

Since the first volcanoes spewed hot magma from deep below the earth's surface, subterranean heat has produced silica-based glass. Shiny and unmistakable, obsidian has been used by many peoples around the globe since prehistoric times to make weapons and tools and for economic trade.

A universal challenge for archaeologists is accurately assigning a time period of origin to inorganic artifacts. Organic materials can often be dated using the carbon-14 technique, but this approach won't work for inorganic artifacts such as obsidian tools. Obsidian hydration dating, originally created by the U.S. Geological Survey's Irving Friedman and Robert Smith in 1960, was a step towards a more accurate system aimed at dating obsidian artifacts on the basis of the depth to which water was absorbed into the initially fresh surface.

This original approach to obsidian dating used an optical microscope and was often highly inaccurate. When data obtained using the optical microscope was compared with carbon-14 ages, there was a significant difference in the numbers and a large amount of scatter, rendering most obsidian dates useless.

Scientists at ORNL and the University of Tennessee are working to crack the code to accurately reveal the age of the glassy stone. Larry Anovitz, Lee Riciputi, David Cole, J. Michael Elam and Mostafa Fayek have been re-creating the obsidian hydration dating technique, using state-of-the-art analytical techniques and insights into the hydration process.

The theory of obsidian hydration dating is quite simple. From the moment a fresh obsidian surface is exposed during the process of manufacturing a new tool, atmospheric water begins to seep into the glass. The longer the surface is exposed, the deeper the water penetrates. By discovering how long it takes hydrogen from water in the environment around the glass to move through the obsidian and how that happens, the ORNL group hopes to create a more precise formula that links the depth of hydrogen diffusion with the age of the artifacts.

Researchers have used a number of techniques to investigate the hydration process. These have included machines like the Filter Analyzer Neutron Spectrometer at

(See OBSIDIAN, page 4)



Curtis Boles

INTERNATIONAL COMMUNITY
Sawa Fujiwara, 2, gets a lift from her dad, Masatsugu, at August 27's Community Day. Mom, Eri, works in the Metals & Ceramics Division. The Fujiwaras, who are from Japan, joined more than 4,000 visitors. More photos are on page 6.

Bye-bye B-25s

Lab makes progress in shipping out bothersome bins of low-level waste



Curtis Boles

Beautiful sight: B-25 boxes leaving. ORNL has speeded the removal of the low-level waste storage bins.

Big and green with magenta and yellow stickers, the metal boxes that have homesteaded outside ORNL facilities are beginning to disappear. Thanks to a more efficient process between ORNL and Environmental Management contractor Bechtel Jacobs, the containers of low-level radiological waste are being shipped west to permanent disposal sites.

The progress in shedding the waste is "the fruition of organizational changes in Waste Services, collaboration with EM programs and Bechtel Jacobs and some well placed investments by ORNL," says Environment, Safety, Health and Quality Director Karen Downer.

"You should soon be seeing a noticeable difference around the campus," Karen says.

The radiological waste, which is categorized as low-level by regulatory bodies, consists of items ranging from contaminated trash and filters to furniture to heavy equipment. Contaminated items are typically wrapped or put into bags and placed into the B-25 containers for further disposition.

Up until now, actually making the "further disposition" happen has run into bottlenecks. The bins have hung around because the system for handling them was divided among different parties, which has resulted in inefficiencies. It also costs a lot of money, and that too is divided among

(See B-25s, page 2)

B-25s

Continued from page 1

different parties and programs.

"Getting the stuff in the boxes is the easy part. Getting it packaged correctly, characterized correctly with all the right numerical values of the isotopes, verifying that it isn't or won't be chemically hazardous, and making sure it meets all the rules and regulations of the disposal site is the hard part," explains the Environmental Protection & Waste Services Division's John Powell.

"Sending the material to engineered landfills out West is a fairly involved process with lots of regulations and disposal facility requirements. It's very detailed work to make sure all the transportation requirements are met, that the waste meets the disposal

ORNL has more than doubled the amount of low-level waste shipped from two years ago.

facilities' requirements and that the documentation to prove it is in order. It takes lots of hard work by lots of dedicated people across the Laboratory."

The process was split between science and EM program funds and divided among different subcontractors and vendors. Money for the process also comes from different funders; EM pays only for disposal. The preparation work is funded by the generator, in the Lab's case, UT-Battelle.

"That puts two-thirds of the cost on our side," John notes. "But without the third from EM, the waste still does not go away."

ORNL got the waste-disposal ball rolling earlier this year by requesting to take over the entire process. The Lab also jump-started the system with an inflow of reserve funding. Finally, DOE-EM helped by increasing their funding for the disposal piece.

"This is the first year ORNL has managed

its radiological waste from A to Z. We used Lab funds to characterize the waste and EM funds for the disposal. For some of the waste, we partnered with EM's Bechtel Jacobs contractor, and other waste we shipped ourselves. But we managed the entire process for all of it," John says.

The process cut out a lot of inefficiency and worked well. "The big news is that none of it went to on-site storage. It all actually left the Lab," John says.

John emphasized that the Energy Department deserves a lot of the credit. The process was boosted by an almost two-fold increase in 2005 funding from DOE-EM for radwaste disposal.

The results: By this month's fiscal-year end, ORNL will have successfully sent away approximately 1,225 cubic meters—the

equivalent of 475 B-25 boxes—of solid low-level radioactive waste. Compare that with 2003, when 503 cubic meters—the equivalent of 195 B-25 boxes—of

waste were shipped off.

"Stated another way, we have more than doubled the amount of low-level waste shipped from ORNL in FY 2005 versus what left the site two years ago, and increased it 30 percent over what was dispositioned last year," John says.

Everyone's glad to see it go, from the ESH&Q folks to the R&D community. Radiological waste sitting around is bad from more than an aesthetic standpoint.

"Lots of bad things can happen with radioactively contaminated stuff that sits around for years," John says. "There are regulatory time limits for waste, potential nuclear safety issues and other compliance problems. Information on what's actually inside the boxes can be lost or the rules on waste disposition can change."

Plus those green boxes sitting around just look bad. — B.C.

Katrina's havoc sparks giving spirit of Lab employees

In a year of disasters, either close to home or farther away, ORNL staff members have repeatedly come forward with their generosity. The misery Hurricane Katrina brought to the northern Gulf coast has elicited a similar, and increasingly typical, response.

Just a couple of working days after a Team UT-Battelle account was set up for hurricane relief, the fund topped \$50,000, which is the amount UT-Battelle has pledged to match.

Giving didn't stop there. By press time, the fund had topped \$75,000, with the first \$50,000 already delivered to the Red Cross.

"We sent the money on because it is needed," says Community Outreach Manager Brenda Hackworth.

Lab employees and retirees, with UT-Battelle, collected \$190,000 for tsunami relief earlier in the year. A series of local employee misfortunes, including two house fires, have also resulted in the establishment of relief funds.

The Katrina disaster, which obliterated parts of cities along the Mississippi and Alabama coast and rendered New Orleans uninhabitable with floodwaters, comes during this year's United Way drive. Lab Director Jeff Wadsworth urges staff members to support both campaigns.

"I am always amazed by the wonderful generosity of our staff, and I hope that we can find it possible to support both efforts in the days and weeks to come. Hundreds of thousands of our fellow citizens need our assistance in this time of crisis. I encourage you to help in any way you can," Jeff said in an e-mail to staff.

ORNL is also lending technical support to maintaining the aftermath. ORNL's Geographic Information Science and Technology group in the Computational Sciences & Engineering Division has been monitoring for DOE the status of the flow of oil and other commodities in the economically vital gulf region.

"The storm damaged pipelines and port facilities, including Gulfport, Miss., and the Port of South Louisiana, which are major supply facilities," says the group's Amy King. "The ports prepared for the storm by sending their large cranes inland, but even if they can return, there is no power to run them."

The group has also done population analysis and has monitored the status of the railways in the region.

The LandScan technology developed by the GIS group, led by Budhu Bhadhuri, was used earlier in the year in relief and recovery efforts related to the December 26, 2004, Indian Ocean tsunami.—B.C.

Reporter

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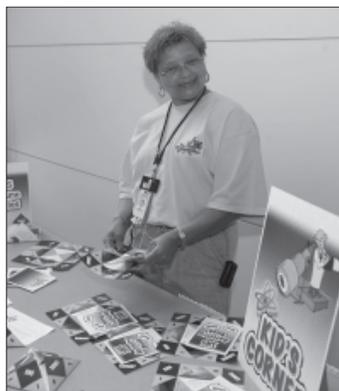
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Vickie Rodgers of the Craft Resources Division volunteered for the Spallation Neutron Source's kids' activities table at August 27's Community Day.

Lab Notes

A life saved

When secretary Susan Johnson yelled "Emergency!" in the hallway of the Engineering Technology Facility on August 22, Engineering S&T Division's Pete Chiaro and John Turner came a-running. A co-worker had suffered a heart attack plus a head wound sustained as he fell to the floor.

"My office is two doors down; John's is around the corner. We were the first ones in there," recalls Pete. "He was not breathing; unconscious. We couldn't feel a pulse."

They rolled him over on his back and started cardiopulmonary resuscitation, one doing mouth to mouth and the other doing chest compressions. Shortly after they switched tasks and before the emergency medical technicians arrived, the victim began to breathe.

"His breathing shocked me, actually seeing it work," says Pete, who says he learned CPR approximately 20 years ago when he worked at a nuclear facility.

The patient is now recovering. Health Services Director Dr. James Phillips says that Pete and John did the right things, including learning CPR, which he says is a lot like riding a bicycle—you don't forget.

"That fellow would probably not be alive today if they had not given stand-by CPR. When our folks got there he required specialized equipment, but those guys did him a big favor," says Doc Phillips.

Doc Phillips is encouraging people to learn CPR and defibrillator techniques and to refresh the training every couple of years (see the August *Reporter*).

"It can be very beneficial for a family member or friend if needed," he says.

UltraScience Net's first data splurge

ORNL built it, but a collaboration of Fermilab and Cal Tech were the first to ride on it. UltraScience Net has been developed by a Computer Science and Mathematics Division team lead by Nageswara (Nagi) Rao and Bill Wing at the behest of the Office of Science. Fermilab and Caltech transferred data between stations recently in the first test of Ultrascience

Net and a new automated networking system at Fermilab called Lambda Station.

"About two years ago, we looked at various needs for high-speed networking capabilities within the Department of Energy's science program," says

Nagi. "From terascale supernova simulations to visualization of genomics data to data from particle collisions, there is a demand for stable, dedicated, high-bandwidth connections to exchange data.

"With the UltraScience Net, research institutions can book a connection, and nobody can interfere with your circuit while you transfer data at high speed," he says.

The test between systems at Fermilab and Caltech, in preparation for the reams of data to come from the Large Hadron Collider experiment, achieved a rate of seven gigabits per second, which is 15 times faster than

DOE's other network, Energy Sciences Network, or ESnet.

Fueleconomy.gov's heyday

A Website maintained since October 1999 by ORNL transportation researchers for DOE and the Environmental Protection Agency is enjoying some of its heaviest traffic.

Its subject: fuel economy.

Since the recent rises in gasoline prices, the fueleconomy.gov website has seen a corresponding rise in user sessions. The site, which typically averages from 20,000 to 30,000 user sessions a day, charted more than 160,000 user sessions on September 1.

Maintained by ORNL's Fuel Economy Information Program as part of DOE's Clean Cities Program, the site is a guide to the most fuel-efficient vehicles and offers the public tips on how to achieve the best fuel economy.

"We were mentioned earlier in the summer on the *Today Show* and got 88,000 user sessions. It nearly messed up our server," says group member Bo Saulsbury. "People are really paying attention to the site now."

Reported by Bill Cabage



Building 1000 goes through the shredder.

Building 1000 is no more

While ORNL's Community Day was showcasing the new east campus on August 27, over on the west side part of the old ORNL was coming down. Demolition of the '40s-era Building 1000 began on August 24.

Project manager Steve Laman says the razing is now complete, but hauling away all the rubble may take a couple of months.

Building 1000 was noted for creaky floors, drafty doors and invading mammals of various species, but the offices also provided a familial setting for its variety of tenants over the years, most recently staff in the accounting, contracts and engineering organizations. There was also plenty of parking nearby.

The teardown is part of a Lab campaign to take outmoded and expensive-to-maintain structures off the books as new facilities, such as the Multipurpose Research Facility on the east side, are built.

There are currently no firm plans for the Building 1000 site.

Obsidian

Continued from page 1

the National Institute of Standards and Technology and the Fourier-Transform Infrared Spectrometer. They are revealing new information about how water and hydrogen are bonded within the molecular structure of volcanic glass.



Anovitz

Possibly the most important piece of equipment used in this study, however, is the Secondary Ion Mass Spectrometer run by Lee Riciputi's group at ORNL. SIMS makes it possible for the scientists to directly measure the diffusion profile by analyzing the concentrations of hydrogen, oxygen and other elements as a function of depth below the sample surface. SIMS replaces the old, inaccurate and imprecise optical approach with a direct measurement of the hydration profile.

"SIMS allows us to look at variations in hydrogen concentration with depth in very narrow diffusion profiles," says Larry Anovitz, who became interested in the problem of hydration dating in 1993 after attending an anthropology conference. Larry says this level of analytical detail has allowed the group to make several novel observations about the diffusion process.

They initially observed that plots of hydrogen concentration with depth had an odd shape. Instead of the exponentially decreasing curve common in diffusion profiles, the curves were S-shaped, decreasing only slightly at first, then rapidly beyond a given depth. This suggested that there was a strong interaction of the water with the glass.

Even more unexpected was the relationship between the hydrogen and oxygen from the environmental water in the glass. The traditional school of thought is that water permeates the surface of the stone and diffuses deeper with time.

On the basis of the SIMS analyses, however, the group has hypothesized that only hydrogen moves beyond the surface of the obsidian.

"If you analyze both the hydrogen and oxygen concentrations with depth, you'd expect the oxygen profile would look like the hydrogen curve. That is, for every two hydrogens you add to the glass, you'd expect to add one oxygen. Instead, the oxygen curve is flat," Larry says.

That may mean that oxygen doesn't enter the glass—the obsidian appears to be splitting the water molecule and acting as a hydrogen-storage material.

Despite the chemical insights obtained from the SIMS data, the researchers are unsure how this transition happens, where the hydrogen goes within the molecular structure of the glass, what state it is in as it moves, and how often it jumps from bond to bond with available oxygen.

"We do know that, on a relatively long time scale, the hydrogen appears to form hydroxyl groups on the glass surface and water molecules in the bulk glass, but we don't know the details of either structure, or the extent to which vacancies or other defects in the glass structure play a role," Larry says.

The Fourier-Transform Infrared Spectrometer, which measures bond vibrations, cannot register how often the hydrogens break and form bonds. In the one- to two-minute scan period, the hydrogen can move several times, changing from H⁺ ions, which aren't infrared-active, to other molecular species of hydrogen that can be detected by the machine.

The group hopes that neutron reflectometry studies, recently begun in collaboration with William Hamilton of the Condensed Matter Sciences Division, will help to clear up some of the mysteries of changes in the surface of the glass during hydration.

In addition to their experimental and mechanistic studies, the researchers are also focusing on archaeological applications of the hydration-dating technique. To date the group has been focusing on obsidian from the near the town of Pachuca, in the Sierra de las Navajas, or Mountain of the Knives, in central Mexico.



Mostafa Fayak of the Chemical & Isotopic Mass Spec group works with a very small obsidian sample.

The obsidian from that area is a distinctive olive green. It was widely traded in prehistoric times and is easy to identify, making it an ideal subject for comparative dating. Studies at the Chalco site in the Basin of Mexico have already proven that high-precision dating is possible.

Accurate dating appears to require construction of an initial calibration curve for a given site or region, but the archaeological calibration curve is easy to create if a few stratigraphic correlations between obsidian samples and carbon-14 dates are available.

"If you can do a calibration curve, you can get good dates from obsidian hydration," Larry says. The group is now looking into expanding these applications to other sites in Mesoamerica and new locations as far away as the ancient city-state of Catal Hoyuk in central Turkey.—Eva Millwood

Barreras named HR director

Lori Barreras has been named Human Resources director, following a short term as interim director. Lori joins the



Barreras

Leadership Team reporting to Lab Director Jeff Wadsworth. She comes to ORNL from Pacific Northwest National Laboratory, where she served as manager of Workforce & Staffing Programs and, before that, as an EEO/AA and diversity specialist. Before joining PNNL, Lori worked with both the Equal Employment Opportunity Commission and the Internal Revenue Service.

Lab scores in SE FLCs

The Southeast Region of the Federal Laboratory Consortium for Technology Transfer has announced its 2005 awards. ORNL's Excellence in Technology Transfer Award winners are

- Polyelectrolyte Thin-Film Array Slide, whose developers include Jizhong Zhou and Xichon Zhou, both of the Environmental Sciences Division;
 - Flame Doctor Burner-Monitoring System, whose developers include Charles Finney and Stuart Daw of the Engineering S&T Division; and
 - Laser-Based Item Monitoring System, whose team includes Peter Chiaro, Curt Maxey, Tim McIntyre and Fred Gibson of ESTD.
- Honorable mention: SensArray Integrated Wafer Wireless Microchip Fabrication Monitor, whose co-developers included ESTD's Carl W. Sohns and Lab retirees Bob Lauf and Don Bible.

ORNL also shares the Southeast FLC'S first partnership award with USEC for their collaboration with gas centrifuge technology.

Big chill

SNS already charting 'first, most' with successful cold linac commissioning

The Spallation Neutron Source has passed a crucial milestone on its way to completion next year—the commissioning of the superconducting section of its linear accelerator.

The first of its kind and one of the SNS's most critical components, the superconducting linear accelerator, or "cold linac," is performing "beyond expectations," says the SNS team.

"The successful commissioning of the cold linac is the major step toward the 2006 completion of the SNS and demonstrates the success of the collaboration of national labs in keeping the project on time, on budget and on scope. It represents, technically, the most complex system of the SNS accelerator complex, and successful completion of the test is a major reassurance that we can achieve what we promised—and probably more," says SNS Director Thom Mason.

The SNS linac is composed of two sections: a room-temperature, or warm, section, which started operation last September, and a superconducting, or cold, section, which operates at temperatures hundreds of degrees below zero. The cold linac provides the bulk of the power that drives the linac.

The Thomas Jefferson National Accelerator Facility in Virginia, part of the team of six DOE national laboratories that have collaborated on the Office of Science project, is responsible for the superconducting linac and its refrigeration system. Los Alamos National Laboratory provided the radio-frequency systems that drive the linac.

The cold linac provides 80 percent of the total acceleration in the 1,000-foot-long linac. During the testing that began the first week in August, the system performed beyond

expectations, achieving its design energy within a few days of being turned on, says SNS Accelerator Systems Division Director Norbert Holtkamp.

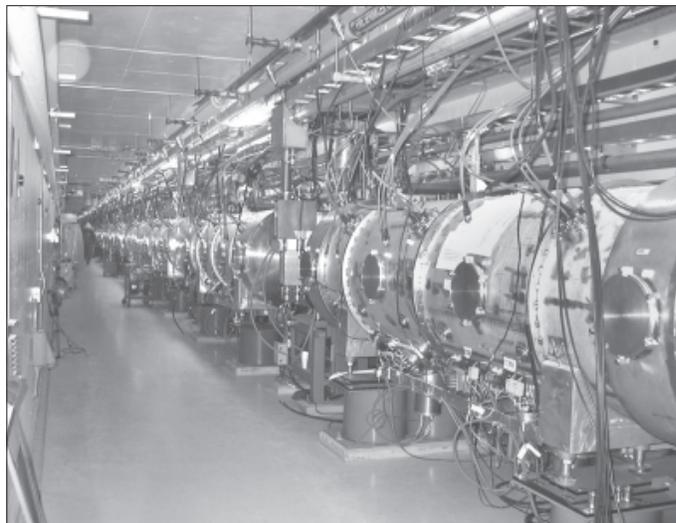
"The SNS linac is the first superconducting linac in the world to provide pulsed, high-power ion beams. Use of this technology—developed in a worldwide collaboration—is unique and was unthinkable only a decade ago. It provides extremely high-quality beams, as well as substantial savings in electrical power, on the order of \$2 million per year," Norbert says.

Jefferson Lab, which has pioneered the development of superconducting linac technology, was brought onto the SNS collaboration when the decision was made to incorporate the superconducting technology into the SNS design.

"Jefferson Lab congratulates the Oak Ridge SNS team on this major milestone," said Claus Rode, SNS project manager for Jefferson Lab. "The SNS project was a challenging five-year effort: We built on [Jefferson Lab's] expertise in superconducting

radiofrequency technology and experience building and operating the large Jefferson Lab-installed base of superconducting technology."

Because of their lack of charge, neutrons have a superior ability to penetrate materials. Researchers can determine a material's molecular structure by analyzing the way the



The superconducting section of the Spallation Neutron Source's linear accelerator provides 80 percent of the total acceleration.

neutrons scatter, or "spall," after striking atoms within a target material. SNS will produce neutrons by sending a high-energy beam of protons down the 1,000-foot linac to ultimately strike a liquid mercury target, which will direct the spalled neutrons to a host of state-of-the-art instruments.

SNS will increase the number of neutrons available to researchers nearly tenfold, providing clearer images of molecular structures. Together, ORNL's High Flux Isotope Reactor and SNS will represent the world's foremost facilities for neutron scattering, a technique pioneered at ORNL shortly after World War II.

Besides Los Alamos and Jefferson Lab, the three DOE national laboratories that joined ORNL in the SNS collaboration are Argonne, Lawrence Berkeley, and Brookhaven.

When completed next year, SNS will become the world's leading research facility for the study of the structure and dynamics of materials using neutrons. It will operate as a user facility that will enable researchers from the United States and abroad to study the science of materials that form the basis for new technologies in telecommunications, manufacturing, transportation, information technology, biotechnology and health.—B.C., with Charlie Horak

ORNL people

John Hsu of the Engineering S&T Division was recently elected a fellow of the Institute of Electronics and Electrical Engineers. The IEEE is the largest professional engineering society in Europe and has a worldwide membership of 120,000.

The Engineering S&T Division's **Debra T. Bain** and the Condensed Matter Sciences Division's **Nancy J. Dudney** were winners at the Knoxville YWCA chapter's annual Tribute to Women banquet. Nancy, who was nominated by John Cooke, was the winner in the science and technology category. Debra, nominated by Glen Harrison and Ted Fox, won the administrative professional category.

Amit Goyal, leader and task manager of Superconducting Materials Research in the Metals & Ceramics Division, has joined the North American sub-board of *Superconductor Science and Technology*, a multidisciplinary

journal for papers on superconductivity. The journal covers theories of superconductivity, the basic physics of superconductors, the relation of microstructure and growth to superconducting properties, the theory of novel devices, and the fabrication and properties of thin films and devices. Amit is currently also on the editorial boards of the *Journal of Materials Research* and the *Journal of the American Ceramic Society*, as well as on the international editorial advisory board of the *Journal of the Korean Institute of Applied Superconductivity and Cryogenics*.

J. Michael Starbuck, **George C. Jacob** and **David A. Dillard** received the best paper award from the Advanced Composite Materials and Systems Track for the 2005 Society for Experimental Mechanics Annual Conference & Exposition. The paper, titled "Dynamic Testing for Quantifying Rate Sensitivities in Bonded Composite Structures," will be published in the *SEM Journal of Experimental Techniques*.

More than 4,000 come to Community Day



It had been eight years since ORNL opened its doors for a community day. Anyone who hadn't been to the Lab since then might have been a little disoriented—after all, a complex of shiny new buildings now occupied the place where they probably parked in 1997.

ORNL said it was “ready for the next generation of great science,” and it was ready for Community Day.

Around 4,000 guests and staff members and their families turned out on Saturday, August 27. The Research Office Building's Main Street and the Research Office Building lobby were packed at times, as were the scientific exhibits in the state-funded JICS/ORCAS building. The plasma fusion program was a hit, with sessions filled to capacity.

Busloads of the curious trekked up Chestnut Ridge to see for themselves the Spallation Neutron Source. Nearly all of the attendees said they wanted to see the SNS, and getting that many folks to the site was a logistical feat that took weeks of planning.

People had a good time. Community Outreach Manager and event organizer Brenda Hackworth gave credit to the volunteers, who numbered around 200.

“I want to express my thanks especially to the many volunteers who were the key to an event that went incredibly well,” says Brenda. “The volunteers at the east campus and SNS made the day.”

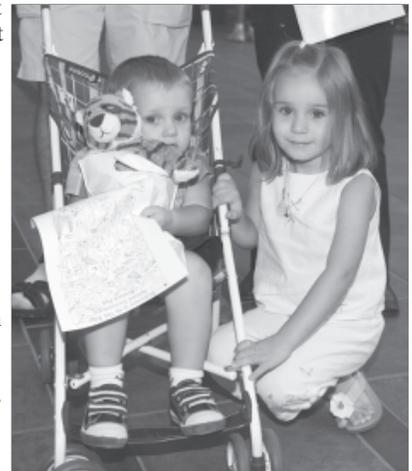
Because of security concerns, all attendees had to register in advance to come. Fears of backups at the vehicle entrance didn't materialize, though, as guests came prepared with confirmations and IDs as requested.

Many staff members took the opportunity to bring family to the Lab. Renae Humphrey of the Office of Strategic Planning says the day may have inspired a scientific career for her son, Leon Jr., who was particularly impressed with the EVEREST visualization lab.

“On Saturday, Mom was ‘awesome!’” says Renae. “It did make my heart feel good for a day.”—B.C.



Photos by Curtis Boles
and Jim Richmond



Like maps? Like resources? Visit the Research Library's GIS work station

One of ORNL's best-kept and most educationally fun secrets is hidden in plain sight in the Research Library.

The unassuming Geographic Information Systems workstation in a corner near the library's reference desk contains a single desk, globe, printer and computer, but the software packed onto the Dell machine is world-class. The six programs (Keyhole 2 Pro/Earthviewer, Maptitude, National Geographic Maps, TopoUSA, 3D TopoQuads and Street Atlas USA 2004) allow users to do virtually anything they want to with maps, demographic information, directions, travel planning and much more.

Mapitude is the only true GIS program on the kiosk, says Mark Dickey, an ORNL research librarian and GIS enthusiast who began assembling the workstation in 2003. "The characteristic of a GIS is that it allows you to do data analysis," Mark says. "It's a database where you can analyze layers of information." Maptitude enables the combination of geographic and U.S. Census Bureau demographic data to reveal relationships and patterns.

Although there is a learning curve with the

more advanced features of Maptitude, the other programs are very user friendly and enthralling. The National Geographic Maps software contains every map insert contained



ORNL staff members have a trove of geographical tools at their disposal in this quiet corner of the library.

in the magazine from 1899 to the present, and Street Atlas USA can be used for travel planning, showing everything from distances and driving times to rest stops and exits. The topography programs are a combination of street-mapping and elevation that shows users two- and three-dimensional maps of

streets, trails and terrain.

Since the station was moved from a high-traffic corridor to its new corner home, librarians believe users just need to find its new home.

"It's been disappointing to me that the use of it has gone down since we remodeled," Mark says. "Once people learn where the workstation is located I expect it will be used more."—*Eva Millwood*

Service Anniversaries

September

30 years: Lorena Faith Truett, Edward C. Fox and Randall Lee Linkous, Engineering Science & Technology; Danny M. Williams, SNS Experimental Facilities; Dan L. Million, National Center for Computational Sciences; Ronald H. Baldwin, Metals & Ceramics; Roger D. Spence, Nuclear Science & Technology; Mary Anna Bogle, Environmental Sciences; James N. Parks and Roger Dale Collins, Craft Resources; Larry E. Hoover, Fabrication; Norma F. Cardwell, Business & Information Services Dir.

25 years: Terrence L. Donaldson and Cameron W. Coates, Nuclear Science & Technology; Barbara J. Frame, Metals & Ceramics; Vernon F. McClain, Cliff P. White, David E. Smith, T. Randall Curlee, John J. Tomlinson and George W. Ott, Jr., Engineering Science & Technology; Terry G. Sanford, Facilities Management; A. Carter, Business & Information Services Dir.; Karen N. Gibson, Environmental Sciences; Pam A. Love, Communications & External Relations Dir.

20 years: Jacob Barhen, Computer Science and Mathematics; Mark Dwain Carter, Fusion Energy; Gerald E. Smith, Business & Information Services Dir.

New Staff Members

ORNL continues to grow. Welcome to the following new Laboratory employees.

Richard Kim Archibald, Computer Science and Mathematics
Natasha Pyle Blair, Nonreactor Nuclear Facilities
Elissa Jayne Chesler and Robert Frank Standaert, Life Sciences
Lewis Albert Galyon and Richard Joseph Goyette Jr., SNS Experimental Facilities
Ricky Allen Kendall, Lisa Jordan Rael and Scott Alan Klasky, Center for Computational Sciences
Ralph Henry Prince IV, Laboratory Protection
David Robert Resseguie and Kalyanrao Srinivas Perumalla, Computational Sciences & Engineering
Jerry Dee Finch, Craig Alan Fitzpatrick, Danny Gordon Futrell, Keyona Danielle McCowan, David Nick Sharp, Anthony Lamar Williams, William Fredrick Muncy, Phillip Wayne Holder, Christopher Robert Irish and Clarence Douglas Wells Jr., Craft Resources
Jennifer Renee Furl, Research Reactors
Zheng Gai, Condensed Matter Sciences
Igor Borisovich Jouline and Olaf Oliver Storaasli, Computer Science & Mathematics
Phani Teja Venkata Appayya Kuruganti and Daniel Bernard Koch, Computational Sciences & Engineering
Damon Brent Starr, National Security Directorate
Georgeta Radulescu, Nuclear S&T, Leigha Marie Stewart, Tech Transfer & Economic Development
Timothy Allen Lehberger and Bradley Kyle Woody, Nonreactor Nuclear Facilities
James W. Diamond, SNS Accelerator Systems
Chuck Hall Hensley, Accounting
Michael Byron Houston, Kenneth Rex Veach Jr., Stephen Francis Alvanas and Cecil Horace Gibb, Quality Services
Megan Erica Elwood Madden and TongMing Yin, Environmental Sciences
Alena Vladimirovna Zhernosek, Klaus-Peter Ziock and Vincent Joseph Jodoin, Nuclear S&T
Jeremy Lee Moser, Metals & Ceramics
Neil Allen Thomas, Engineering S&T
James Darrell Rhyne and Jennifer Lynn Tippens, Networking & Computing Technologies

Retiree Green dies in Florida

Richard L. Green, former electronics technician in the Instrumentation and Controls Division, died recently in the Tampa Bay area of Florida. He was 68. Dick retired from the Lab in 1992 after nearly 28 years of service. Following his early retirement he and his wife, Jane, did missionary work in Central and South America, visiting a dozen countries.

The business side of science

A summer intern gets an inside look at the Lab—and a job

BY KATIE MEDLOCK

We all know that having work experience is crucial to getting a job. Being a senior in finance at the University of Tennessee, Knoxville, this concept has been imbedded in my mind from the very start. Everyone always said, “You must have an internship if you want a job when you graduate.” So when my junior year rolled around, I started the hunt for a good internship.

There are a lot of companies out there, but finding one that fell in line with my needs was really hard. I was looking for an internship that would give me great experience, was fun, and interesting. During the spring, I interviewed with three different companies and received two offers.

Why did I choose to work for UT-Battelle? As a native of Knoxville, I am well aware of the Lab’s highly respected reputation. I also felt that working at the Lab would be much more interesting than some other jobs. That is why I accepted the offer to become a Business and Information Systems summer intern here at the Lab.

The first couple of days were a little nerve racking because the only other job I have ever experienced was serving at restaurants. It was fascinating, though, being able to finally see the inside of ORNL after living in Knoxville for almost 13 years. I mean, I always knew the Lab was here, but I was never actually allowed to see it.

I was placed in the Small Business Programs Office. At first, I felt like a fish out of water because I had no idea what I was doing. I soon began to feel comfortable, though, and I quickly learned about what the Small Business

office actually does. I guess you could say it’s the business side of all this great science.

The Small Business office serves as the advocate and point of contact for small businesses and educational institutions, including Historically Black College and Universities, seeking contracting opportunities to link them to science and technology programs at ORNL. This entails providing information and guidance on getting a contract with the Lab. With Kim Hinton as my mentor and Will Minter as my supervisor, I saw the tremendous amount of time and effort they spend working in this office.

I never would have thought that small business can be big business until I traveled with Kim to Nashville for the DOE Small Business Conference.

There were over 1,500 people in attendance, consisting of DOE prime contractors and small businesses. I quickly realized that ORNL is well respected by DOE and other M&O contractors; in fact, ORNL is one of the major contributors to the conference each year. My job while I was there was to assist with the ORNL booth during the business expo.

I was so surprised to see how many small businesses there are that want to work with the Lab. Most people just wanted to know where to start, and what they needed to do to get their foot in the door. A lot of contacts were made and hopefully a lot of future contracts, too.

The conference was a really good opportunity to encounter a wide variety of businesses (and interesting characters) and to see what it is like to work in the Small Business office.

My time as an intern is over, but already this job has influenced my future. On the last



Katie Medlock (right) was mentored this summer by the Small Business Programs Office’s Will Minter and Kim Hinton.

day of my internship, I found out that I had received a part-time position as the finance officer for the Asset Management and Contracts Divisions. It’s a lot of responsibility, but I am positive that it will be a great opportunity for me to learn so much more. So, as I work towards graduation in May, I will also be working towards a future here at the Lab.

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Reporter

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**UT-BATTELLE**