

‘Ewww. Let’s try it.’

From forensics to environmental science, elemental fingerprints uncover the clues

The Environmental Sciences Division’s Madhavi Martin has reinvented an old analytical method, finding some very new applications for the technology in the process. She uses laser-induced breakdown spectroscopy—a technique invented in the 1960s—to collect elemental fingerprints.

The LIBS method uses a focused laser to evaporate sample materials, breaking down all of the bonds and producing optical emissions of very specific wavelengths depending on the elements present within the sample.

“The wavelength emissions are the fingerprints of the elements in the sample,” Madhavi says. “One advantage of the method is that I can analyze any kind of sample: liquid, solid, gas or aerosol.”

One of her collaborators at the Lab has continued to test the claim that her method can work with any kind of sample. Arpad Vass approached her about five years ago, asking if the method she had been using to analyze wood chemistry could be applied to bone.

“My first reaction was, ‘Ewww, bone?’ My second reaction was, ‘Let’s try it,’” says Madhavi.

After looking at the first few bone samples, she realized that she could see clear differences between them.

“Well, you are what you eat,” Madhavi says.

Her method can even determine whether you took your multivitamins or not.

“We need more bones in the experimental data set before the method is ready to be used for biological profiling, but the results are promising,” Madhavi says, pointing out the peaks in the spectrum that tell her the bone sample is probably from a woman who took her daily supplements.

The same method can be used to differentiate between human and animal bones.

“Sometimes people find a fragment of bone in the backyard, and this method can quickly determine whether it is human or not,” says

Madhavi, explaining that the wait for DNA sequencing may be as long as a month and could be inconclusive for old bones. The



Madhavi Martin subjects a chunk of wood to laser-induced breakdown spectroscopy.

method could also be used to analyze bones that have been exposed to conditions that degrade DNA, like high heat or the passage

(See LIBS, back page)

Jaguar purrs its way to elite ranking, simulation prize

Following a series of upgrades, Jaguar, the Cray XT located in ORNL’s Leadership Computing Facility, is the cat’s meow of supercomputers. Its peak performance of 1.64 petaflops (quadrillion floating point operations, or calculations, per second) makes it the world’s fastest supercomputer for science.

Jaguar immediately put its speed to work, helping a team led by ORNL’s Thomas Schulthess win the prestigious Gordon Bell Prize for the fastest performance ever in a scientific supercomputing application.

The new 1.64-petaflop system is more than 60 times more powerful than its original predecessor, a 26-trillion-calculation-per-second (teraflop) system installed only three years ago. It also came in as number two on the industry standard Top500 list, topped only by Los Alamos National Laboratory’s Roadrunner, which will be used primarily for classified research.

Jaguar is now a combination of two systems—a 1.382-

petaflop XT5 and a 266-teraflop XT4. The XT5 and XT4 systems are separately ranked second and eighth, respectively, on the current Top500 list.

The Top500 ranking, announced November 17, is decided twice a year using a benchmarking algorithm, a test program called HPL, for High-Performance Linpack. The Gordon Bell Prize, administered by the Association for Computing Machinery, recognizes supercomputing speed during a simulation exploring a real scientific problem.

“We are proud to be home to the world’s most powerful computer dedicated to open science, but we are more excited about the ability of Oak Ridge and the Department of Energy to take a leading role in finding solutions to scientific challenges such as new energy sources and climate change,” Laboratory Director Thom Mason says.

To win the Gordon Bell Prize, Schulthess and colleagues Thomas Maier, Michael Summers and Gonzalo Alvarez achieved 1.352 petaflops on Jaguar with a simulation of a

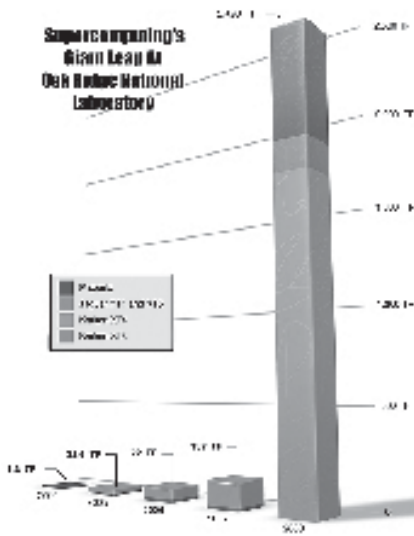
(See JAG, page 2)



The fast feline on the Cray Jaguar’s cabinets symbolizes the speed of the state-of-the-art supercomputer inside.

superconducting material.

For nearly a century researchers have investigated superconductors for their ability to conduct electricity without resistance, or energy loss. The challenge is that superconducting materials must be very, very cold. Even so-called high-temperature superconductors—discovered in the mid-1980s—must be chilled to a “transition temperature” of around -200°F before they exhibit their amazing behavior. A full scientific explanation



Expressed as a bar graph, ORNL's supercomputing power shot up like bamboo in FY2008.

tion of how high-temperature superconductors work remains elusive.

The team focused on chemical disorder in high-temperature superconductors known as cuprates—layers of copper oxide separated by layers of an insulating material. By advancing the understanding of the interplay between imperfections in materials and superconductivity, the work promises to help researchers push transition temperatures ever higher, possibly approaching the lofty

goal of “room-temperature superconductors,” or materials that exhibit this behavior without artificial cooling.

Thomas Zacharia, the associate Laboratory director for Computing and Computational Sciences, says petascale machines like Jaguar help advance critical scientific application areas by enabling researchers to get answers faster and explore complex, dynamic systems.

“Supercomputing is a technology that drives science forward,” says Thomas. “Particularly at a time when energy is a compelling problem, what we do with it is critical to the next generation and beyond.”

In the days following the latest upgrade, Jaguar ran scientific applications ranging from materials to combustion on the entire system, sustaining petaflop performance on two applications. Thomas notes that calculations that once took months can now be done in minutes.

Jaguar's impact is already being felt. A 2008 report from the DOE Office of Science says six of the top ten recent scientific advancements in computational science used Jaguar to provide unprecedented insight into supernovas, combustion, fusion, superconductivity, dark matter and mathematics.

Through the Innovative and Novel Computational Impact on Theory and Experiment program, which allocates the supercomputer's resources through a peer-reviewed proposal system, researchers in academia, industry and government were allocated more than 140 million processor hours for 30 projects last year. (A “processor hour” is equivalent to an application running one hour on one processing core; one hour using Jaguar's 182,000 processing cores, for example, would be equivalent to 182,000 processor hours.)

To date the computer simulations on Jaguar have focused largely on addressing new forms of energy and understanding the impact on climate resulting from energy use. INCITE projects have simulated enzymatic breakdown of cellulose to make production

of biofuels commercially viable as well as coal gasification processes to help industry design near-zero-emission plants. Combustion scientists have studied how fuel burns, which is important for fuel-efficient, low-emission engines. Computer models have helped physicists use radio waves to heat and control ionized fuel in a fusion reactor. Similarly, engineers have designed materials to recover energy escaping from vehicle tailpipes. Simulation insights have enabled biologists to design new drugs to thwart Alzheimer's fibrils and engineer the workings of cellular ion channels to detoxify industrial wastes.—*Reported by Leo Williams, Dawn Levy and Sarah Wright*

ALD Akers steps down, Reinhold is 'our Mann in Kuala Lumpur'

ORNL's Leadership Team has experienced some recent departures.

Frank Akers is stepping down as National Security director. One of the original Leadership Team members, Frank has increased the NSD's program portfolio since 2000 by nearly tenfold, from \$40 million to \$375 million in 2008.

Frank will remain as a senior fellow. Harvey Gray is serving as interim ALD.

Former Associate Lab Director Reinhold Mann's recent move involved a lot more travel. After leading his directorate, Biological and Environmental Sciences, to a major victory with the new Bioenergy Sciences Center,

he has moved to Kuala Lumpur, Malaysia, to help Battelle Asia lead the new PETRO-NAS Renewable Energy Laboratory there.

Gary Jacobs is serving as ALD in the interim.

From the other side of the world, Reinhold recently sent this “postcard” to Lab Director Thom Mason's blog:

“Re-learned driving European style (or better Parisian style), w/o killing any of the gazillion moped and motorcycle riders who simply do not obey any rules ... It's an energizing start-up environment with all the up-and-downsides ... Found German and French bread, good beer and wine, great food.

“Miss everybody.” —*B.C.*



Akers



Mann

Reporter

is published for employees and retirees of Oak Ridge National Laboratory, which is managed by UT-Battelle for the U.S. Department of Energy.

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Lab Notes

A monument for Gravel Hill

The Oak Ridge Reservation is dotted with cemeteries. Two have unusual structures called grave houses that shelter burial sites, in some cases the graves of children.

The two graves at the New Bethel Church across from the ORNL campus are well maintained. The other is off the beaten path, on Copper Ridge, which forms the north shore of Melton Hill Lake.

Retiree Bill Shinpaugh's great-great grandparents, William Hudson, born in 1816, and Matilda Hudson, born in 1820, are buried on the Copper Ridge site, called Gravel Hill, which before World War II was a small community that included a church and a school. Their foundations are all that remain.

"The family moved here from West Virginia in the 1790s," Shinpaugh says, making them an original Tennessee family.

Shinpaugh and Bill Alexander, a former ORNL staff member who has retained an interest in the Lab's history and culture, made arrangements to deliver a marble headstone to the small Hudson gravesite, which is surrounded by a crib made of deteriorating chestnut rails. The roof of the structure is long gone. Others, including children, are

believed to be buried in the small plot.

Except for the ORR, grave houses are not common in this region of the country. It's not really understood why they occur in the area that became the ORR.

"The history of grave shelters is not well documented," Alexander says at the site. "There are theories on why people built shelters around the graves, such as to protect them from the rain. This is the only log one that I

know of."

Time and vegetation are steadily erasing traces of the Gravel Hill community, but Bill Shinpaugh's monument for William and Matilda Hudson will mark their legacy for years to come.

'False spring' rings true at SERCh

It was a cold snap that many in these parts remember, and it led to the winning project at DOE's Science and Energy Research Challenge national poster competition at ORNL on November 10.

The "Easter freeze" of early April 2007 hammered area vegetation and fruit crops that had been coaxed out of their winter dormancy by an unusually warm March.

Garrett Marino, of Hazlet, N.J., a student at Massachusetts Institute of Technology who interned this year at ORNL, won the SERCh poster competition and a \$10,000 science scholarship with a study on the Southeast's "false springs."

Marino looked at weather records back to 1900 seeking trends that might be attributable to climate change.

"What I found was the risk for false springs in the Southeast has not changed. But if you look sub-regionally, in the deep South there is increased risk of false springs, while in the western Southeast it has decreased," Marino says.

He says the next steps for the research are to connect the varying subregional effects of a warming climate to global climate change.

Marino's ORNL mentor, the Environmental Sciences Division's Dale Kaiser, who was out of the country during the competition, was understandably tickled to hear of his protegee's success.

Marino competed

against 83 other top undergraduates from colleges and universities across the country. Students presented abstracts, posters and talks detailing their research and top presenters were named in the fields of biological sciences, materials science and engineering, chemistry, physics and environmental science.

"We saw some of the future leaders of science and technology in this country, and that's very exciting," says the University of Tennessee's Lee Riedinger, who helped begin the SERCh event's predecessor, Day of Science, when he was the Lab's deputy director for science and technology.

Cyberthreat: Avoid a bad taste

ORNL ramped up its focus on computer security during the month of November. While computer users on-site are now more knowledgeable about the cyber threat from outside, many of the lessons apply at home or anywhere.

Service providers are constantly battling fraud artists, just as ORNL has erected elaborate firewalls to keep hackers at bay. Cybersecurity's Phil Arwood says that stronger and smarter firewalls mean that crooks look for vulnerable entry points to socially manipulate their way into our computers.

Most often, those attacks come in the form of phishing, or e-mails containing a disguised link or an attachment containing a malicious program code.

Phil notes that attacks may also literally go around the firewalls by enticing users to place tainted removable data-storage media, such as CDs and thumb drives, directly into their own machines. For example, unsolicited CDs received by mail or given out at conferences or thumb drives that appear to be misplaced could harbor programs that could compromise an entire network if introduced into a computer.

"You should be as unwilling to insert any removable media you happen to find into your computer as you would popping a piece of candy found on the floor into your mouth," Phil says.

Phil's other rules to go by: There are steps you can take to reduce the threat, such as, if you weren't expecting the message and don't recognize the sender, don't open attachments. Don't click on links in e-mail messages. Use a search engine from your Web browser such as Google to help validate links, and manually enter the address in your browser instead. Never respond to messages asking for user IDs or passwords. Your bank or credit card company will never send solicitations of that kind, but the bad guys will.

While it is very important to keep your antivirus software up to date, it is also important to remain vigilant and exercise common sense. If it looks phishy, it probably is.

Reported by Bill Cabage and Sarah Wright



Curtis Boies

Up on Copper Ridge at what remains of a grave house, Bill Shinpaugh pauses with his forebears' new marker.

Singh, Pierce, Dobbs receive Director's Awards

Outstanding contributors lauded at 2008 Awards Night

Three outstanding researchers and a team received Director's Awards at this year's Awards Night, held on November 14. The Director's Award winners are chosen from among the category winners by Lab Director Thom Mason.

The Materials Science & Technology Division's **David Singh** received the Director's Award for Outstanding Individual Accomplishment in Science and Technology recognizing his development of effective theoretical approaches with applications to key problems associated with novel and complex materials for basic science, as well as technological advances that have profoundly impacted condensed matter physics.

Mike Pierce of the Nonreactor Nuclear Facilities Division earned the Director's Award for Outstanding Individual Accomplishment in Laboratory Operations for his efforts to guarantee continued support for the Laboratory's nuclear research and development mission both during and after a transition of the NNFD that has saved the Lab millions of dollars while improving operations.

The Director's Award for Outstanding Individual Accomplishment in Community Service went to **Mark Dobbs** of the Information Services Technology Division for ongoing service to both international and local communities, including efforts to provide medical needs following natural disasters.

The Director's Award for Outstanding Team Accomplishment was presented to a group that has worked to significantly advance nuclear fuel cycle research capabilities. Staff from the Materials Science and Technology Division, the Nonreactor Nuclear Facilities Division and the Nuclear Science and Technology Division made up the team, consisting of **Dale Caquelin, Guillermo Daniel Del Cul, Robert Jubin, Steve Owens, Barry Spencer, Raymond Vedder, Elisabeth Walker** and team leader **Gary Bell**.

Awards Night is held in recognition of contributions from researchers and staff over the past year. Congratulations to this year's honorees.

Laboratory Operations

Secretarial Support

Lisa A. Starbuck, Transportation Program and NTRC User Facility. For sustained excellence in administrative and secretarial support to the Transportation Program Office and as the senior administrative assistant at the National Transportation Research Center.

Administrative Support, Nonexempt

Susan D. Jennings, Global Nuclear Security Technology Division. For excellence in facility planning, securing a multi-organization agreement for laboratory space assignment, and significantly contributing to the establishment of the safeguards laboratories as national user facilities.

Integrated Safeguards and Security Management

Carl E. Thomas, Douglas Alred, Philip C. Arwood, Eddie Bishop, Mark Floyd, John J. Gerber, Tina Heath, Mark Lorenco, Jeffrey Schibonski, Matthew D. Smith, R. Scott Studham, and Bobby N.



This year's Director's Award winners for outstanding individual accomplishments are (top, from left) David Singh, science & technology; Mike Pierce, Laboratory operations; and Mark Dobbs, community service.



Present at Awards Night to receive the team award were (bottom, from left) Elisabeth Walker, Raymond Vedder, Robert Jubin, Lab Director Thom Mason, Dave Caquelin and Gary Bell.

Administrative Support, Team

Dave Keller, Teresa Ault, Susan R. Barnett, Katherine Brooks, Debbie Gray, Janice V. Hughes, Janet A. Loope, Jane McConnell, Barbara J. Frazier Swails, and Sara L. Trammell, Laboratory Protection Division. For providing outstanding site access support and customer service to new employees and visitors to ORNL.

Excellence in Safety Leadership

Mark E. Baldwin, Safety Services Division. For an outstanding career dedicated to excellence in safety.

Sweet, Counterintelligence Support Programs, Information Technology Services Division, National Security Directorate, Office of the Chief Information Officer. For superior performance and dedication in ensuring that ORNL cyber security programs both enable the scientific mission and protect our sensitive and valuable information.

Administrative & Operations Leadership, Group Level

Michael J. Pierce, Nonreactor Nuclear Facilities Division. For improving nuclear operations and safety through outstanding goal setting, planning, and follow-through.

Bargaining Unit Support

Jim A. Ayers, Jack M. Crawford Jr., Ken Guymon, and Jeffery A. Patty, Facilities Management Division, Nonreactor Nuclear Facilities Division. For implementing an innovative plan to restore remote manipulators used in hot cell operations essentially to an as-new condition, resulting in an estimated cost avoidance of greater than \$500,000.

Operations Support

Patricia Dreyer Parr, George F. Baber, Norm Durfee, Tammy Harrison, Joan W. Lawson, R. Cecil Peters, Matt Powell, Harry Quarles, Michael G. Ryon, and Elizabeth Doull Wright, Facilities and Operations Directorate, Campus Support and Instrumentation Division, Facilities Development Division, Safety Services Division, Environmental Sciences Division, Environmental Protection and Waste Services Division. In recognition and appreciation of integrated teamwork to enhance the beauty and uniqueness of the ORNL campus through innovative and ecological approaches to landscaping using East Tennessee native plants.

Community Service

Exceptional Community Outreach by an Individual

Mark W. Dobbs, Information Technology Services Division. For a long history of providing outstanding humanitarian aid and volunteer assistance to those in need in East Tennessee and overseas.

Steve Lewis, Environmental Protection and Waste Services Division. For his extraordinary volunteer efforts to test, monitor, and clean up the rivers of our state.

Esprit de Corps

Vanessa Grebert, Budhendra Bhaduri, Niels de Jonge, Nancy L. Gray, Brenda Hackworth, Diana Peckys, and Sindhu Zacharia, Human Resources Directorate, Computational Sciences and Engineering Division, Materials Science and Technology Division, Human Resources Directorate, Communications and External Relations Directorate, Center for Nanophase Materials Sciences Division, Business Management Division. For establishing and maintaining the Multicultural Friendship Club to promote greater cultural awareness and understanding among members of ORNL's diverse community and their families.

Community Leadership

Teresa D. Ferguson, Energy and Engineering Sciences Directorate. For providing selfless, dedicated service to her community

and to ORNL and for the many voluntary civic responsibilities she has assumed for Roane County and the city of Kingston.

Science Communicator

David L. Greene, Energy and Transportation Science Division. For sustained excellence, extraordinary communications skills, and visionary efforts to formulate, influence, and educate policy makers and the public on future alternatives in transportation energy policy.

Science & Technology

Technical Support

Darrell K. Thomas, Dayrl P. Briggs, Jason Fowlkes, Dale K. Hensley, Nickolay Lavrik, Laura Morris Edwards, Scott T. Retterer, and Teri Subich, Center for Nanophase Materials Sciences Division, Biosciences Division. For successful operation of the Nanofabrication Research Laboratory at the Center for Nanophase Materials Sciences and the growth of a vibrant user community.

Early Career Award for Engineering Accomplishment

Kevin T. Clarno, Nuclear Science and Technology Division. For outstanding leadership and technical contributions in the application of high-performance computing to the modeling and simulation of nuclear energy systems.

Early Career Award for Scientific Accomplishment

Gabriel M. Veith, Materials Science and Technology Division. For advances in nanoscale catalyst synthesis by new vapor deposition methods leading to fundamental understanding of the stability of nanoparticles on surfaces and the interactions between nanoparticles and support surfaces.

R&D Leadership, Group Level

Joseph M. Giaquinto, Chemical Sciences Division. In recognition of his committed leadership and vision as an R&D leader in the field of analytical chemistry in support of ORNL's nuclear, national security, and environmental stewardship programs.

R&D Leadership, Director Level

James E. Rushton, Nuclear Science and Technology Division. For exemplary leadership of the Nuclear Science and Technology Division and his outstanding contribution to the success of ORNL's nuclear and national security programs.

Excellence in Technology Transfer

Robert K. Abercrombie, William R.

Besancenez, David L. Beshears, Julius E. Coats Jr., Lee Hively, Mark Reeves, Gregory David Richardson, Matthew B. Scudiere, Fredrick T. Sheldon, and Clifford P. White, Computational Sciences and Engineering Division, Contracts Division, Department of Defense Programs, National Security Directorate, Energy and Transportation Science Division, Measurement Science and Systems Engineering Division, Partnerships Directorate. For commercialization of Weigh in Motion (WIM) and the Automated In-Motion Vehicle Evaluation Environment (AIMVEE) for both military and civilian use.

Inventor of the Year

John T. Simpson, Measurement Science and Systems Engineering Division. For significant inventive contributions to the fields of sub-wavelength optical devices and nanostructured materials.

Engineering Research and Development

Gary L. Bell, Dale A. Caquelin, Guillermo Daniel Del Cul, Robert T. Jubin, Steve Owens, Barry B. Spencer, Raymond Vedder, and Elisabeth A. Walker, Materials Science and Technology Division, Nonreactor Nuclear Facilities Division, Nuclear Science and Technology Division. For significant achievement in expanding ORNL and U.S. capabilities to conduct fundamental and applied R&D in radiochemistry and nuclear fuel reprocessing.


Scientific Research

David J. Dean, Gaute Hagen, Morten Hjorth-Jensen, and Thomas Papenbrock, Office of Institutional Planning, Physics Division. For development and implementation of coupled-cluster theory for medium mass and neutron-rich nuclei.

Distinguished Engineer

William P. Partridge Jr., Energy and Transportation Science Division. For sustained and innovative developments that have substantially improved the knowledge base of engine, after-treatment, and fuel-cell systems.

Distinguished Scientist

David Joseph Singh, Materials Science and Technology Division. For outstanding scientific impact on condensed matter physics through development of effective theoretical approaches and their application to key problems associated with novel and complex materials for basic science, as well as technical advances. 

Summary Annual Reports

Summary Annual Report for GROUP WELFARE BENEFIT PLAN FOR EMPLOYEES OF CERTAIN EMPLOYERS AT THE U.S. DEPARTMENT OF ENERGY FACILITIES AT OAK RIDGE, TENNESSEE

This is a summary of the annual report for the Group Welfare Benefit Plan for employees of certain employers At the U.S. Department Of Energy, (Employer Identification No. 54-1987297, Plan No. 506) for the period January 1, 2007 to December 31, 2007. The annual report has been filed with the Employee Benefits Security Administration, as required under the Employee Retirement Income Security Act of 1974 (ERISA).

BASIC FINANCIAL STATEMENT

The value of plan assets, after subtracting liabilities of the plan, was \$-993,985,085 as of December 31, 2007 compared to \$-1,003,846,180 as of January 1, 2007. During the plan year the plan experienced an increase in its net assets of \$9,861,095. This increase includes unrealized appreciation or depreciation in the value of plan assets; that is, the difference between the value of the plan's assets at the end of the year and the value of the assets at the beginning of the year, or the cost of assets acquired during the year. During the plan year, the plan had total income of \$193,095,358. This income included employer contributions of \$138,265,877 and employee contributions of \$64,690,576. Plan expenses were \$202,956,452. These expenses included \$10,073,156 in administrative expenses and \$192,883,296 in benefits paid to participants and beneficiaries.

YOUR RIGHTS TO ADDITIONAL INFORMATION

You have the right to receive a copy of the full annual report, or any part thereof, on request. The items listed below are included in that report:

1. An accountant's report; and
2. Insurance information including sales commissions paid by insurance carriers. To obtain a copy of the full annual report, or any part thereof, write or call the office of the Plan Sponsor

Babcock & Wilcox Technical Services

Y-12, LLC, Employer

P.O. Box 2009, MS 8258

Oak Ridge, TN 37830

54-1987297 (Employer Identification Number)

865-241-2966

You also have the right to receive from the plan administrator, on request and at no charge, a statement of the assets and liabilities of the plan and accompanying notes, or a statement of income and expenses of the plan and accompanying notes, or both. If you request a copy of the full annual report from the plan administrator, these two statements and accompanying notes will be included as part of that report. These portions of the report are furnished without charge.

You also have the legally protected right to examine the annual report at the main office of the plan:

Babcock & Wilcox Technical Services

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Oak Ridge, TN 37830

and at the U.S. Department of Labor in Washington, D.C., or to obtain a copy from the U.S. Department of Labor upon payment of copying costs. Requests to the Department should be addressed to: U.S. Department of Labor, Employee Benefits Security Administration, Public Disclosure Room, 200 Constitution Avenue, NW, Suite N-1513, Washington, D.C. 20210.

Summary Annual Report for SAVINGS PROGRAM FOR EMPLOYEES OF CERTAIN EMPLOYERS AT THE U.S. DEPARTMENT OF ENERGY FACILITIES AT OAK RIDGE, TENNESSEE

This is a summary of the annual report for the Savings Program for employees of certain employers at the U.S. Department Of Energy, (Employer Identification No. 54-1987297, Plan No. 009) for the period January 1, 2007

to December 31, 2007. The annual report has been filed with the Employee Benefits Security Administration, as required under the Employee Retirement Income Security Act of 1974 (ERISA).

BASIC FINANCIAL STATEMENT

Benefits under the plan are provided by a trust (benefits are provided in whole from trust funds). Plan expenses were \$108991986. These expenses included \$617198 in administrative expenses and \$108374788 in benefits paid to participants and beneficiaries. A total of 11735 persons were participants in or beneficiaries of the plan at the end of the plan year, although not all of these persons had yet earned the right to receive benefits.

The value of plan assets, after subtracting liabilities of the plan, was \$1,526,579,633 as of December 31, 2007 compared to \$1,457,831,483 as of January 1, 2007. During the plan year the plan experienced an increase in its net assets of \$68,748,150. This increase includes unrealized appreciation or depreciation in the value of plan assets; that is, the difference between the value of the plan's assets at the end of the year and the value of the assets at the beginning of the year, or the cost of assets acquired during the year. The plan had total income of \$177740136, including employer contributions of \$2,2107,055, employee contributions of \$61,122,702, gains of \$119,141,371 from the sale of assets and earnings from investments of \$-34,720,964.

MINIMUM FUNDING STANDARDS

Enough money was contributed to the plan to keep it funded in accordance with the minimum funding standards of ERISA.

YOUR RIGHTS TO ADDITIONAL INFORMATION

You have the right to receive a copy of the full annual report, or any part thereof, on request. The items listed below are included in that report:

1. An accountant's report;
2. Assets held for investment; and
3. Information regarding any common or collective trust, pooled separate accounts, master trusts or 103-12 investment entities in which the plan participates.

To obtain a copy of the full annual report, or any part thereof, write or call the office of the Plan Sponsor Babcock & Wilcox Technical Services

Y-12, LLC

P.O. Box 2009, MS8267

OAK RIDGE, TN 37830

54-1987297 (Employer Identification Number) 865-574-9110

You also have the right to receive from the plan administrator, on request and at no charge, a statement of the assets and liabilities of the plan and accompanying notes, or a statement of income and expenses of the plan and accompanying notes, or both. If you request a copy of the full annual report from the plan administrator, these two statements and accompanying notes will be included as part of that report. These portions of the report are furnished without charge.

You also have the legally protected right to examine the annual report at the main office of the plan: Babcock & Wilcox Technical Services

Y-12, LLC

P.O. Box 2009, MS8267

OAK RIDGE, TN 37830

and at the U.S. Department of Labor in Washington, D.C., or to obtain a copy from the U.S. Department of Labor upon payment of copying costs. Requests to the Department should be addressed to: U.S. Department of Labor, Employee Benefits Security Administration, Public Disclosure Room, 200 Constitution Avenue, NW, Suite N-1513, Washington, D.C. 20210.

Summary Annual Report for RETIREMENT PROGRAM PLAN FOR EMPLOYEES OF CERTAIN EMPLOYERS AT THE U.S. DEPARTMENT OF ENERGY FACILITIES AT OAK RIDGE, TENNESSEE

This is a summary of the annual report for the Retirement Program Plan for employees of certain employers at the

U.S. Department Of Energy, (Employer Identification No. 54-1987297, Plan No. 001) for the period January 1, 2007 to December 31, 2007. The annual report has been filed with the Employee Benefits Security Administration, as required under the Employee Retirement Income Security Act of 1974 (ERISA).

BASIC FINANCIAL STATEMENT

Benefits under the plan are provided by a trust (benefits are provided in whole from trust funds). Plan expenses were \$200,287,858. These expenses included \$31,821,931 in administrative expenses and \$168,465,927 in benefits paid to participants and beneficiaries. A total of 14,769 persons were participants in or beneficiaries of the plan at the end of the plan year, although not all of these persons had yet earned the right to receive benefits.

The value of plan assets, after subtracting liabilities of the plan, was \$3,258,201,885 as of December 31, 2007 compared to \$3,113,889,517 as of January 1, 2007. During the plan year the plan experienced an increase in its net assets of \$144,312,368. This increase includes unrealized appreciation or depreciation in the value of plan assets; that is, the difference between the value of the plan's assets at the end of the year and the value of the assets at the beginning of the year, or the cost of assets acquired during the year. The plan had total income of \$344,028,405, including gains of \$55,227,136 from the sale of assets and earnings from investments of \$259,150,345. The plan has contracts with MetLife, The Prudential Insurance Company of America, METLIFE, and METLIFE which allocate funds toward individual policies.

MINIMUM FUNDING STANDARDS

An actuary's statement shows that enough money was contributed to the plan to keep it funded in accordance with the minimum funding standards of ERISA.

YOUR RIGHTS TO ADDITIONAL INFORMATION

You have the right to receive a copy of the full annual report, or any part thereof, on request. The items listed below are included in that report:

1. An accountant's report;
2. Assets held for investment;
3. Transactions in excess of 5 percent of the plan assets;
4. Insurance information including sales commissions paid by insurance carriers;
5. Information regarding any common or collective trust, pooled separate accounts, master trusts or 103-12 investment entities in which the plan participates; and
6. Actuarial information regarding the funding of the plan.

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Retirees' column: The level income option

A number of retirees have elected to take the Level Income Option at retirement, which is available for employees who elect to retire prior to age 62.


The option increases the retiree's pension for the years from the date of retirement until the first of the month after he or she turns 62. The amount of increase considers the estimated Social Security that the retiree may be entitled to at age 62 and provides an amount so that Social Security plus pension after 62 would be approximately equal to the pension prior to that age.

What happens at age 62

On the first of the month after the retiree reaches 62, the pension will decrease to the new amount. This will occur even if the retiree elects not to receive Social Security until a later time. The reduced pension amount then remains steady for the remainder of the retiree's life.

It needs to be noted that the retiree's pension is paid on the first of the month, but Social Security payments are not received at that time. Social Security checks are staggered throughout the following month, and an individual may not receive a Social Security payment until the fourth Wednesday of that following month. This means that the retiree will have a lower income for up to one month and four weeks. Retirees should be aware of this and make plans accordingly.

CORRE activities

The Coalition of Oak Ridge Retired Employees (CORRE) is an organization established for the benefit of retirees of contractor-operated facilities in Oak Ridge. Additional information regarding membership in CORRE may be obtained from CORRE's web site, <http://www.corre.info> or by mail at PO Box 4266, Oak Ridge TN 37831-4266. 

Promethium discoverer, reactor manager die

Two ORNL Manhattan Project veterans died in November.

Lawrence Elgin Glendenin, a co-discoverer of promethium while he was working at ORNL during the Manhattan Project, died on November 22 in Illinois. He was 90.



Glendenin

Glendenin was a chemist at the then-Clinton Laboratories during World War II assigned to separate, identify and characterize the radioactive properties of elements found during nuclear fission. He, Jacob

Marinsky and Charles Coryell isolated the previously undocumented rare earth element 61 in 1944.

James Albert Cox died in Roswell, Ga., at age 92. He came to Oak Ridge during World War II as an Army draftee assigned to the Manhattan Project. After the war he joined the new radioisotopic program. By 1950 he assumed responsibility for the Graphite Reactor and in 1952 the Low Intensity Testing Reactor. His responsibilities eventually included the Oak Ridge Research Reactor, the High Flux Isotope Reactor, the Bulk Shielding Reactor, the Tower Shielding Reactor and the Health Physics Research Reactor.

Cox was a pioneer of nuclear safety, writing the first *Manual for Operations of Research Reactors*.

Service Anniversaries

December 2008

35 years: Kenneth Dale Adcock, Materials Science and Technology

30 years: Robert H. Staunton, Energy & Transportation Science; Rebecca A. Fortner, Chemical Sciences; Michael L. Emery, Business & Information Services Dir.; James W. Terry and Keith F. Eckerman, Environmental Sciences; Sherrell R. Greene, Energy & Engineering Sciences Dir.; David B. Poker, Materials Science and Technology; Frank C. Kornegay, Neutron Sciences Dir.; Norma Gail Vineyard, NScD Research Reactors; William W. Koch, Jr., Integrated Operations Support; Ranell W. Lane, Nuclear & Radiological Protection; Michael W. Stooksbury, Facilities Management; Philip C. Arwood, Office of Chief Information Officer

New Staff Members

November 2008

Carman Disann Bradford, Center for Nanophase Mat'l's Sciences
Stuart Ian Campbell, NScD Neutron Scattering Science
Meghan McNeilly Drake, Biosciences
Arthur Wayne Hensley, NScD Research Accelerator (Transfer)
Brian Christopher Jolly, Materials Science and Technology
Jason Andrew Oberhaus (Transfer), George S. Swinler (Transfer) and Benjamin M. Gibson, Global Initiatives Dir.
Kenneth Robert Schneider and Nicole Lynn Waters (Transfer), Audit and Oversight Dir.
Adam Stephen Bengston and Mark Ethan Cantrell, Computational Sciences & Engineering
Ricky James Coffey and Misty Denise Mincey, Campus Support & Instrumentation
Darris Landon Hill, Contracts
Terry Ray Jones, Computer Science and Mathematics
Travis Manning Smith, Energy & Transportation Science
Stephen Charles Couston, Information Technology Services
Rhonda Jones Holloway, Human Resources Dir.
Kevin Lawrence Weiss, Chemical Sciences

25 years: Sherry E. Williams, Environmental Protection & Waste Svcs; Cecil Albert Carmichael, Jr., Materials Science and Technology; Tracey L. Rollins, Facilities Management; Doug Miller, Safety Services; George F. Baber, Campus Support & Instrumentation; Dwight A. Clayton, Measurement Science & Systems Engr; Randy McPherson, NScD Neutron Scattering Science; David Howard Cook, NScD Research Reactors; Gary H. Henkel, Quality Systems and Services; Larry P. Garland, Fabrication, Hoisting & Rigging; George Ostrouchov, Computer Science and Mathematics

20 years: Laura W. Wagner, Energy & Transportation Science; W. Don Creekmore, Facilities Management; David W. Bradford, Prime Contract Administration; B. Lamar Leopard Jr., Information Technology Services; Bob Conrad, Communications & External Relations Dir.; Carolyn J. Ladd, Human Resources Dir.; Marilyn Rich, Business & Information Services Dir.; Ronald Lee Rucker, Logistical Services

Deaths

Richard W. Reid, who worked in the Computational Sciences & Engineering Division, died November 20. Dick had 21 years of service. He was leader of the Data Systems Sciences and Engineering group.

Dick's career spanned a number of prominent projects, most notably the SensorNet program and other information technology projects related to the national security mission. Dick convivially occupied one of the most visible offices at the Laboratory, on the corner of the Research Office Building directly across from Building 4500-North's Weinberg Lobby. He resided in Knoxville.



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Reporter

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LIBS

Continued from page 1

of time.

Her work has even helped to solve a murder, connecting a suspect to the victim by showing that firewood at the scene of the crime was from the same tree that the suspect later took to a bonfire and burned at his own home.

Early one morning, she got a call from Henri Grissino-Mayer, an expert in tree-ring analysis in the University of Tennessee's geography department, who had been called in to consult on the case. Unfortunately for Grissino-Mayer, the firewood turned out to be from a mesquite tree—one of the worst for analyzing tree rings because of its erratic growth patterns.

"He called and asked if I could test some logs for him, but he didn't mention anything about a murder," says Madhavi. "When I finished testing all 14 of the logs, I was very disappointed because they all looked the same except for one." She called Grissino-Mayer back with the results and he immediately asked which one was different—it was the control, a piece of firewood that wasn't from the case in question.

"He was very excited; I was very surprised when I found out," Madhavi says. "The data that I thought was so uninteresting turned out to be very important—the elemental fingerprint of the logs was the same, tying the suspect to the scene."

Madhavi has gotten a lot of press for her contributions to forensics, but she hastens to add that environmental threats like water and air pollution can also be characterized using the LIBS technique.

She can analyze the environmental conditions present throughout the lifetime of a tree, pulling samples from each ring. Global climate change can be traced by looking at the elements present throughout the lifetime of a tree. Material from 100 years of tree growth takes her about 20 minutes to analyze and requires only a few thousand shots of the laser. Conventional wet-chemistry techniques take much longer and involve extracting and chopping up the wood samples from every ring to be analyzed.

Madhavi is also using the technique to improve phytoremediation of large-scale polluted areas.


The use of plants to clean up environments that have high levels of pollutants such as mercury or TNT shows much promise. Some plants take up and sequester the pollutants better than others. Using her method, Mad-

havi says that she can monitor the amount of pollutants present in prospective plants, helping to choose the best candidate for phytoremediation efforts.

"It's been exciting because the tools that we have now—better lasers, better instruments for detection—have revived the LIBS technology," she says.

People are using LIBS to look at all kinds of materials, but Madhavi

is one of the few using it for environmental analysis.

"I get calls and get to collaborate with all kinds of people because I am in this wonderful niche," Madhavi says. —Sarah Wright 



LIBS can shed light on not only where bones come from, but also whether their owners took their vitamins.