

Material challenges

ORNL's Lawrence Award winner specializes in overcoming hostile environments



Steve Zinkle's work addresses materials needs in fusion power and deep-space travel.

Decades ago, the late ORNL metallurgist and industry leader Bill Manly famously observed to fusion scientists that "if you can solve the plasma and wall problems, we will solve the blanket problem on a Sunday afternoon."

Manly was referring to the technology that the lining, or blanket, of a burning-plasma fusion reactor would demand—materials with certain critical properties that were also capable of withstanding an extremely harsh environment. Manly was confident that the structural materials problems of fusion were less daunting than the huge issues the 1960s posed for plasma confinement and high-heat-flux components. But he was never called in to work on that conjectural Sunday.

Through the years, researchers have continued to explore the materials challenges represented by fusion and other highly radioactive environments. One of those researchers, Steve Zinkle, has received ORNL's first Ernest Orlando Lawrence Award in more than a decade, predominately for his fusion materials work.

Steve's research has spanned more than two decades of investigating the effects of radiation on metals and ceramics as would be encountered in fusion and fission applications. He is a UT-Battelle corporate fellow and director of the Materials Science & Technology Division.

The energetic neutrons released as part of fission and fusion reactions can damage materials; Steve says knowing the physical processes behind and nature of

the damage is critical to the development of the high-performance, degradation-resistant materials required for fusion reactors. The hope is that these reactors will one day power the electric grid virtually pollution free.

"I've spent a majority of my research career on fusion materials—20 years or so—investigating the physical phenomena responsible for radiation damage; to understand it well enough to prevent undesirable degradation from happening in suitably designed materials," the materials scientist says.

Steve lists five "scourges" of radiation damage. ORNL veterans may be most familiar with embrittlement, a concern with aging nuclear reactor vessels that once idled the High Flux Isotope Reactor for an extended period in the 1980s. Owing largely to ORNL reactor-vessel research that absolved the concerns, HFIR received the all-clear to operate.

"Embrittlement occurs at low temperatures, up to about one-third of the material's melting point, and at relatively low doses," Steve says. "Other phenomena show up in more extreme environments—higher temperatures and doses—including void swelling, irradiation creep, phase instabilities and, at very high temperatures, helium embrittlement at grain boundaries."

Fusion reactors, the plasma-confinement type most notably represented by the upcoming international ITER experiment, will run the gamut of radiation-induced damage in materials.

(See ZINKLE, page 5)

Tech maturation funds nudge science to marketplace

ORNL conducts fundamental research, which often results in new inventions. Some of these inventions have near-term market potential, especially with a nudge from maturation funding, which is awarded once a year through a Lab-wide call.

Eight research projects have been awarded \$393,000 in technology maturation funding, one of the ways ORNL's technology transfer program pumps royalties collected from the technology it licenses back into Laboratory research.

The projects range from weigh-in-motion technology to a technique that would identify chemical composition of nanoscale materials to a solar tracker controlling device for concentrator photovoltaic systems that magnify hundreds-fold the intensity of the sun.

- Other projects include
- demonstration of hybrid spread spectrum signaling for wireless applications in harsh, industrial environments;
 - development of a new imaging microscopy method to advance micro electro mechanical systems, or MEMS devices used to for inspection in the semiconductor industry;
 - field testing of a tank and crucible manufactured by the company Foseco based on ultrasonic vibration technology previously developed at ORNL that is used in degassing molten aluminum;
 - development of a process and engineering model for a carbon fiber composite molecu-

- lar sieve and an accompanying technique used in gas separation systems; and
- development of electrical analysis signature technology to detect tampering in nuclear monitoring systems.

Technology maturation funding is one way royalties are pumped back into Lab research.

Projects selected for funding came out of ORNL's bioscience, computational, environmental and materials science divisions.

The projects were selected from among 26 proposals and awards ranged from \$33,500

(See MATURATION, back page)

Herb Mook elected neutron scattering society fellow

Herbert A. Mook Jr., a senior researcher in the Neutron Sciences Directorate, has been elected to the Neutron Scattering Society of America's inaugural group of fellows.



Mook

The NSSA honored Herb, a UT-Battelle Senior Corporate Fellow, for his pioneering neutron scattering experiments on novel phenomena in condensed matter, including investigations of the magnetic interaction and its role in the properties of superconducting materials.

The society also cited Herb's work for advancing the art of neutron scattering research.

His inventions have received two R&D 100 Awards—the neutron transmission polarizer in 1989 and the ultrasonically pulsed neutron spectrometer in 1984.

"I am delighted that Herb Mook has been given this prestigious recognition. Breakthroughs in advanced materials are required to solve society's most pressing energy-related problems, and these breakthroughs often involve condensed-matter sciences. Herb's career, particularly his contributions to neutron scattering science, has played and continues to play a key role in our progress toward these energy goals," says ORNL Director Jeff Wadsworth.

Herb's neutron science career at ORNL began in 1965; his experiments have employed neutron beams from the Oak Ridge Research Reactor, now decommissioned, and the more powerful High Flux Isotope Reactor, which was recently upgraded with new beam lines and a cold neutron source.

ORNL is currently commissioning the Spallation Neutron Source, the DOE Office of Science's new accelerator-driven neutron source that, combined with HFIR, will make ORNL the world's leading center for neutron

scattering research.

Herb received his master's degree and doctorate from Harvard University. He was the SNS's first scientific director and also directed ORNL's Center for Neutron Scattering from 2000 to 2004.

A fellow of the American Physical Society, Herb has published more than 200 scientific papers, including coauthorship with the late Nobel laureate and neutron scattering pioneer Clifford Shull. These papers have been well received by the scientific community: Fifty of his papers have been cited more than 50 times, with more than 8,000 citations overall. He holds three patents.

Herb and his wife, Jane, reside on Melton Hill Lake. He has two sons and four grandchildren.—B.C. 

U.S. ITER's Sauthoff IEEE fellow

Ned Sauthoff, currently leading the U.S. role in a global fusion energy project, has been named a fellow of the Institute for Electrical and Electronics Engineers for his work in plasma physics and fusion energy.

Ned heads the U.S. portion of ITER, a joint effort by China, the European Union, India, Japan, South Korea, the Russian Federation and the United States to demonstrate the feasibility of fusion energy.

ITER, Latin for "the way," will be sited in Cadarache, France. The U.S. ITER Project Office is located at ORNL.

Ned received his bachelor's degree in physics and master's degree in nuclear engineering from MIT in 1972 and his Ph.D. in astro-

physical sciences from Princeton University in 1975.

At Princeton Plasma Physics Laboratory, Ned conducted research on plasmas, a super-hot, gas-like substance confined by magnetic field generators, or tokamaks, inside a fusion reactor. He also led the design of control and data systems for the Tokamak Fusion Test Reactor and headed PPPL's Computer Division, Princeton Beta Experiment, and Experimental Projects, Physics, and Plasma Science and Technology departments.

Before the establishment in 2006 of the U.S. ITER headquarters at ORNL, he headed PPPL's Off-Site Research Department, where he managed fusion research on leading facilities around the world.

Ned has served as president and vice-president for technology policy for IEEE-USA. He is a fellow of the American Physical Society and the American Association for the Advancement of Science.—Mike Bradley 



Sauthoff



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Report card: UT-Battelle tallies an 'A' from DOE

UT-Battelle has received an overall "A" on its report card from the Office of Science for its job of operating ORNL in Fiscal Year 2006.

UT-Battelle's total fee for operating ORNL in 2006 is \$10,379,000, or 97 percent of the maximum fee. Under the old system, the Lab would have received an "outstanding" rating.

The letter grade in DOE's revamped process of appraising the labs' performance reflects ORNL's evaluation in the quality and productivity of the company's research and development and for its science and technology program management.

DOE now uses eight performance goals. ORNL received A grades in mission accomplishment and S&T project and program management; A-minus grades in construction and operation of research facilities, contractor leadership/stewardship and facilities maintenance and infrastructure; and B-plus grades in environment, safety and health, business systems and security and emergency response.

ORNL Director and UT-Battelle CEO Jeff Wadsworth says the Laboratory's performance evaluation "is fitting recognition for the fantastic job of the ORNL staff. Whether in science, operations, safety or community outreach, our staff members have adopted the goal of achieving world-class standards in everything they do."

Lab Notes

fell silent.

Part of the Lab's Central Campus Closure Project, demolition involves some of the usual asbestos issues plus some legacy radiological contamination on the roof that most likely dates back to the late 1950s, says

Facilities & Operations'

Lance Mezga. But by this fall the site of the old eatery should be a vacant lot.

who turned his life around, only to die of cancer brought on by his past abuses. His subject turned out to be his brother.

He also recalled a talk he gave at one of the Washington, D.C., area's toughest high schools, where local drug lords served as the role models. As he left, he nervously approached a couple of tough-looking kids who were waiting by his sports car.

Lyles was braced for trouble, but the two kids simply wanted to thank him for coming to their school.

"I don't know what ever became of them," he said, somewhat mistily. "Maybe they became statisticians, maybe they did well."

SNS posts another superlative

The Spallation Neutron Source chalked up another world record in February. The proton beam, which "spalls" the neutrons from the mercury target, was accelerated to 1.01 GeV, attaining the linear accelerator's design energy and setting a new energy record for proton beam acceleration in a linac.

The previous record of 0.95 GeV was set in December 2005, also by the SNS.

The SNS is the first application of a superconducting linac to a pulsed proton beam, says the Research Accelerator Division's John Galambos.

"The increase in beam energy was made possible by a better understanding of the performance capabilities and margins of the superconducting cavities that provide the bulk of the acceleration," John says.

At Jefferson Lab, which contributed the superconducting linac portion of the SNS, the CEBAF accelerator boosts electrons continuously. The SNS beam accelerates protons in pulses, and is apparently doing it well.

The old eatery's days are numbered

One of ORNL's once-most-frequented buildings is slated for the wrecking ball. Building 2010, the old cafeteria, is scheduled to be razed this summer.

The cafeteria had its central location going for it, situated almost midway between the east and west side of the ORNL site. But even that was a dubious distinction: The street corner at Central and Third was shared with the underground storage tank farms that once held liquid waste from the Manhattan Project. So the mid-day walk from the east side involved a tour past a phalanx of pipes and rad warning signs.

That didn't keep the cafeteria, built in 1951, from buzzing at lunchtimes. It was a favored site for special events and had, for the times, a well-equipped conference room. With the opening of the ORNL Conference Center's new cafeteria in November 2004, Building 2010, which had fallen into disrepair,

Gen. Lyles' talk highlights BHM slate

This year's Black History Month featured several noteworthy activities, including the always popular soul-food tasting event (soul food being synonymous with delicious) and a talent show. A highlight of the month was a talk by retired Air Force Gen. Lester Lyles.

Lyles, who is a member of the Battelle board of directors, said he had "dreamed of coming to Oak Ridge" since he studied at Howard University's school of engineering, where they had a small nuclear reactor for training.

"Nobody had one but us," he said. "I fell in love with nuclear energy."

Lyles' distinguished military career—he retired as a four-star general whose last command was over the Air Force's Materiel Command—is coupled with a deep community interest and concern over the challenges that African-American young people face.

Although his own success has been remarkable, he related the story of a wastrel

ORNL: Postdocs like it

ORNL has cracked *The Scientist's* most recent list of "best places to work for post-docs." The Lab came in at No. 15 on the list of



ORNL's Black History Month celebration resulted in something for an Oak Ridge day care to celebrate, as well. Proceeds from BHM activities combined with a corporate gift from UT-Battelle resulted in the \$5,000 gift to Scarboro Day Care. Lab Director Jeff Wadsworth presents the check to facility director Donna Moseby.

15, and is the only national lab on the list.

The life sciences magazine's editor, Richard Gallagher, says, "Our survey is one of the few nationwide efforts to assess [postdoctoral students'] needs and desires and to recognize excellence in postdoc programs."

The Lab hosts from 200 to 250 postdocs. About 50 come under the Computing & Computational Sciences Directorate, where CCS's Debbie McCoy says around half get staff positions.

The survey covered 11 categories in which respondents judged their respective institutions. Categories included the quality of mentoring, the level of communication and opportunities for networking and career development. The magazine says the most important factor cited was the quality of training and career preparation offered by an institution.

Also, UT-Battelle has been selected by *Training* magazine as a recipient of a "TOP 125" award honoring those companies that are "unsurpassed in harnessing human capital."

Reported by Bill Cabage



Building 2010, unlike many of ORNL's older facilities, had a sign that clearly identified its mission.

Not forgotten

Lab employee goes overseas to help kids victimized by a country's poverty

Moldova, the poorest country in eastern Europe, has many orphanages. Known locally as 'boarding schools,' they are filled with abandoned and unwanted children.

Moldova's agriculture-based economy does not offer many jobs, and one third of the country's work force goes to other countries to look for work. Children are left behind to take care of themselves. As a result, 60 percent of children in orphanages have a living family member, while just 40 percent are true orphans.

With little funding to support the institutions, the children often lack food, quality beds, clothes, education and other amenities.

Moldova has a turbulent past that has left more than 80 percent of its population in poverty. It is hardly a prime spot to visit. However, in December 2006, Steven Bonnett, an internal auditor in Audit and Management Services, went there.

Traveling with other members of his church, the Farragut resident entered a world where hot running water is a luxury. He went on a mission of philanthropy but returned with a clearer vision of how blessed he is.

Children's Emergency Relief International is one of the aid-based groups helping Moldova's children. Steven and his group traveled with CERI this year to help with Operation Knit Together. Their aim was to visit all 66 orphanages in the country in three weeks. The teams distributed socks, new winter boots, and a message to the children that someone cared.

Steven's trip was grueling. He says that his shortest day was 13 hours long. He and his team

visited 10 orphanages during the week he was there. Thanks to contributions like Steven's, CERI met its goal.

"For me, I think the ability to go and help someone where there is so great a need was the initial draw," says Steven. "It's one thing to send money for shoes and another thing to make the effort to be able to put them on the feet of the children. It was a natural progression. These children need to feel loved. There were many hugs of appreciation by the children and volunteers."

Frostbite is a large problem among the children of Moldova. It gets very cold and most orphanages lack adequate heating. Steven says that the children were all dressed in multiple layers, but that clothing is often scarce. One orphanage he described gathered up all of the clothing at the end of the year and redistributed it to its inhabitants based on size.

Steven says that it was amazing how little value was placed on human life. At each orphanage they visited, the volunteers would ask the directors about children available for adoption. Steven says that the directors would point out two or three children who were available, and then mention some of the mentally and physically disabled children, saying, "You wouldn't want them. They're sick." As the father of a special needs child himself, Steven says that statements like those were "hard to hear."

The children in the orphanages have bleak futures. At the age of 16, support from the orphanages stops, at which time the children have to fend for themselves. Human trafficking is rampant



Moldovan children sport boots given to them by Children's Emergency Relief International. Many children learn embroidery, as seen here on their pants, as a vocation.

in Moldova and is often a route taken by both females and males to survive. Groups like CERI bring a message to the children that they are not forgotten.

The children would assist the volunteers in unloading the boxes, often without being asked. Steven says that the kids all dressed up in their "Sunday best," and were very receptive to the volunteers.

"The kids were so happy," says Steven. "They would sing for us or recite poetry to thank us."

Steven says he plans to return to Moldova with CERI this year. His trip to Moldova was a life-changing experience, and he strongly encourages everyone to take part in some sort of organization.

"Seriously consider what 'I' can do to make a difference in the world. There are local causes that are great and need attention in the area. Not everyone can go overseas, but make a difference in your area, your state, your country then the world," says Steven. —Whitney Downing

Whitney Downing is a student at Maryville College.



Steven Bonnett gets a "high five" from a group of Moldovan children at the end of his trip in December.

Governor's budget boosts switchgrass-to-biofuels research efforts

Gov. Phil Bredesen has announced his support for a new state alternative fuels initiative that includes \$40 million to build a pilot biomass ethanol plant. The funding joins the \$11.6 million the state has invested in the Joint Institute for Biological Sciences, now under construction on the west campus.

Another \$10 million would be divided between the University of Tennessee and ORNL for research toward producing biofuels from switchgrass.

"We know we can make ethanol from grassy and woody materials," Gov. Bredesen says. "The challenge is producing it in large

volumes and at a price that is competitive with gasoline, and in proving we can be the ones to take the discovery from the laboratory to the marketplace."

The pilot production plant would have a capacity of 5 million gallons of ethanol a year. Switchgrass is seen as a promising bio-feedstock because of its rapid growth, high energy content and ability to grow in a wide range of croplands.

UT and ORNL are currently competing for a DOE-funded Bioenergy Research Center, one of three DOE proposes to build. The UT-ORNL bioenergy center would be housed in

the Joint Institute for Biological Sciences.

Other components of the governor's proposal include

- \$10 million for UT and ORNL to fund additional research to increase switchgrass production and achieve efficiencies in the production of cellulosic ethanol.
- \$3 million in research funding to find other, non-biomass alternative fuel sources.
- \$8 million in agricultural incentives to help Tennessee farmers tap into the new farm-based fuels market and produce switchgrass in the quantities required to supply the pilot ethanol plant.

Zinkle

Continued from page 1

“Fusion creates one of the most hostile environments imaginable—a fusion reactor is a miniature sun surrounded by earthly materials,” says Steve.

“The easiest reaction for commercial fusion is a tritium-deuterium reactor, which produces a very high-energy neutron with about 10 times the energy of a fission neutron. There are a host of accompanying challenges: Nuclear transmutation reactions and radiation damage events that would never happen with fission can become a big problem for fusion materials,” he says.

It will be up to materials scientists like Steve to prevent those problems.

The past 20 years have seen only limited federal research funding for fission reactors. One area that has supported fission materials research, Steve says, is the space reactor program.

While systems in most earth-orbit spacecraft are powered by solar panels, deep-space probes such as Cassini and the Voyagers, which explore the outer solar system where the sun is much dimmer, must use alternative power sources.

The power for many of NASA’s current deep-space exploration vehicles is thermal energy—heat—from the radioactive decay of a plutonium isotope. ORNL has had a storied role in the design and manufacture of components for these interplanetary power sources, namely the clad-vent sets for the radioisotope thermal generators.

But the power systems now in space service generate just a few kilowatts. If we want to explore the solar system in more depth—for example, investigate the frozen oceans on Jupiter’s moon Europa and transmit reams of scientific data back to Earth, or establish human research bases on the moon or Mars, the spacecraft will need more power.

“The current Mars rovers use solar energy, but for the energy demands of a research base, nuclear is a better option,” Steve says. “High-fidelity scientific experiments such as chemical spectroscopy of planet surfaces and the associated data transmission from space probes also require a lot of power, which is not attainable so far from the sun in deep space using solar power.”

The keys to developing more robust space reactors that can stand the radiological stresses—and are sleek enough to launch on a rocket—lie in advanced materials.

“It’s extremely expensive to launch a heavy power system into space; you want as

much thermodynamic efficiency—Watts per pound—as possible, which for a space fission reactor system requires successful development of high-temperature, radiation-resistant materials,” Steve says.

Throughout his career Steve has been lauded for tackling these challenges. The Lawrence Award, created in 1958, recognizes mid-career scientists and engineers for their research accomplishments.

The award is named for Ernest Orlando Lawrence, the Nobel laureate who invented the cyclotron and the calutron.

Steve Zinkle grew up on a farm near Wauzeka, Wisc., a hilly part of the state “similar to East Tennessee,” Steve says. His high school senior class had 26 members; after graduation he enrolled in the University of Wisconsin, where he received his master’s degree in materials science and doctorate in nuclear engineering in 1985.

It was “not the best time to be coming out of school in nuclear engineering,” Steve says. However, a professor who had once worked at ORNL recommended him to a Lab contact for a Wigner Fellowship. Steve was accepted and is now counted among the Wigners who have stayed at ORNL and prospered.

Steve has published more than 200 authored or co-authored peer-reviewed

scientific articles. He is a fellow of ASM International and the American Ceramic Society and is a UT-Battelle corporate fellow. He received the 1992 Fusion Power Associates Excellence in Fusion Engineering award, the 2005 American Nuclear Society Materials Science and Technology Division’s Outstanding Achievement award, and three professional society best paper awards.

He joined the management track in 2001 as a leader of the Nuclear Materials & Science Technology group. In 2006 he was named director of the former Metals & Ceramics Division, succeeding Everett Bloom, who was the ORNL contact instrumental in bringing him to the Lab. Later that year he became director of the new Materials S&T Division.

Steve intends to continue his research work despite the burdens of management. That’s good news for the fusion community. If the ITER project is successful, the “next big step,” Steve says, is scaling up to a fusion demonstration reactor for power generation. ITER, as an experimental reactor, will run only in short spans. A power reactor must run continuously, placing exponentially larger stresses on the reactor materials.

“Then the materials requirements will really come to the forefront,” Steve says.

The task might require the toils of more than a few Sunday afternoons.—B.C.

CFW panel: Women can overcome career challenges

Twenty years ago, Robin Graham arrived for her interview at Oak Ridge National Laboratory for a position in the Environmental Sciences Division with a two-month-old baby in tow.

She got the job and is now a group leader, but her situation illustrates the challenges female researchers face as they juggle family demands and career opportunities in scientific fields still primarily dominated by men.

Graham was one of three panelists featured at a forum held by ORNL’s Committee for Women. The forum, “Women-to-Women: Career Perspectives Across a Generation,” included Graham, an ecologist; Christina Hoffman, who has a Ph.D. in geosciences and works as the lead scientist for design and construction of the single-crystal diffractometer at the Spallation Neutron Source; and Laetitia Delmau, a staff scientist in the Chemical Sciences Division. The women discussed the challenges of being interested in science at an early age and their decision not to be discouraged by peer or family pressure or a lack of female mentors along the way.

“Growing up I went with what I wanted to do,” said Delmau. “It didn’t matter to me (what others thought). I was completely oblivious to the situation.”

Delmau said there are occasions, however, when other researchers don’t take her as seriously on conference calls about particular projects, which she attributes more to age than gender, but perhaps a combination of the two.

Graham said from her perspective the challenges for women working at the Lab primarily revolve around balancing the demands of work and home.

“Dealing with children is still really a challenge,” she said. “I think it’s because this place is so isolated. And balancing childcare and working is really a difficult situation.”

Graham for two years cut back to an 80 percent work-week, going part-time to spend more time with her children. She said she was fortunate to have support from her managers to make such accommodations, allowing her flexible hours and the ability to finish work tasks at home in the evenings.

“I didn’t feel like the division looked down on me as a scientist,” she said, adding, “I’m not saying that was universal.”

Graham cited the business month as one way the Laboratory has become more family friendly.

Delmau and Hoffman, both from Europe, stated that career advancement is easier in the United States, because liberal family leave laws in Europe make research institutions more reticent to hire women.—Larisa Brass

As fusion research advances, materials requirements will come to the forefront.

'Busy takin' care of it'

In six decades of company service, J.W. Dennis hasn't missed a day

A few years ago ORNL celebrated its 60th anniversary. J.W. Dennis, it turns out, wasn't far behind.

J.W., or "Dude," as he is called at work, began his Oak Ridge career in December 1945. With only a couple of interruptions for a war and a layoff, he's marking his 60th service anniversary this month in the Facilities & Operations Transportation Packaging Management group, where he's spent the past several decades packing up isotopes for shipment.

J.W. recalls that, back in the day, isotopes was a big Lab business.

"We never ran out of work. This was a busy place, three shifts, around the clock," J.W. says of working in the 1960s. "We were processing an amazing amount of material for shipping, an amazing amount. It was amazing how fast they got that material together and how fast they got it done."

J.W. originally joined the Oak Ridge work force at K-25, right after the war, as a security guard. A Navy veteran, he had transitioned to the National Guard and was activated for the Korean conflict.

"They were calling it a police action, and after a while I got to thinkin' that you could get killed in a police action just as well as in a war," he says. He left the military and returned to K-25, eventually transferring to chemical operations. He was caught up in a layoff in the late 1950s and found a job with Pan American Airlines at Cape Canaveral, Fla., just as the space race was getting under way.

"If I had realized how the space program was going to go I might have stayed," he says. He watched a launch in 1959 in which

the nose cone blew off at about 1,000 feet. "If there had been anybody in that one they would have been in bad shape," he says.

A friend told him that ORNL was hiring and he returned to the busy isotope shipping group, where he has stayed ever since. J.W., immersed in his work, hasn't paid much mind to the many changes at the Lab through the years.

"We didn't see a lot of the other Lab," he says. "We were busy takin' care of it."

When change happened, he says, sometimes it came very slowly, but sometimes it was fast. The early ORNL was built very quickly, he says.

"It was amazing how fast they got it done and how they got all that material together; how much they accomplished," he says. "You would have to do away with a lot of procedures to work that fast today."

He adds that the speed of the construction of the new east campus was pretty amazing, too.

The materials J.W. shipped originally came mainly from the Oak Ridge Research Reactor. The radioisotopes were contained in small lead "pigs" and then sealed in cans. Workers were protected from exposure to the materials. He says as more was learned about radiation's effects, the work procedures

and protection changed to accommodate new guidelines.

"That's where research has paid off," he says.

J.W. commutes to ORNL from his West Outer Drive home, where he lives with his wife, Marilyn. J.W. used to live in one of the Oak Ridge "flat-tops," says his former paper-boy, ORNL photographer Curtis Boles. Over the years J.W.'s cars have included a 1949 Buick, a 1972 Buick and a 1984 Ford.

One of the more notable things about J.W.'s length of service is that he has showed up for all of it. The man has a perfect attendance record.

"There have been days when I probably should have stayed home, but I didn't. I was sick quite a bit when I was little, and I missed so much school it was pitiful. I had an

uncle who never missed a day of school, and I've thought about how he was a pretty good example not to goof off," he says.

Now 83 years old, J.W. says he sometimes thinks about retirement, but takes life day to day.

"I enjoy my work; I've always enjoyed working here. It's been one of the best jobs I've ever had," says badge number 2301.

"If I did leave, I don't know where I'd find a job this good if I had to go back to work!"—B.C. 🍀



Curtis Boles

J.W. Dennis says the isotope packaging business was hectic in the 1960s.

ORNL People

The Materials S&T Division's **Tim Burchell** has been named chair of the subgroup on graphite core components by the American Society of Mechanical Engineers. Tim leads the Carbon Materials Technology group.

The Materials S&T Division's **Amit Goyal** has been invited to join the *NanoTech Briefs* editorial advisory board. *NanoTech Briefs* reports on nanotech innovations with real-world applications in areas such as electronics, materials, sensors, manufacturing, biomedical, optics/photonics, and aerospace/defense.

The Materials S&T Division's **Sergei Kalinin** has published a book with co-author Alexei Gruverman, titled *Scanning Probe Microscopy: Electrical and Electromechanical Phenomena at the Nanoscale*, in two volumes and 1008 pages.

The Biosciences Division's **Abhijeet Borole** recently presented a keynote speech at Shell Global Solutions' first International Science Symposium in The Hague, Netherlands, titled "Biocatalytic Technolo-

gies for Petroleum Upgrading and Hydrocarbon Conversion."

Communications & External Relations Director **Billy Stair** was one of three local citizens to receive the "Muddy Boot" award from the East Tennessee Economic Council. The Muddy Boot is presented to those who have demonstrated acumen in community vision, business development and building consensus toward attaining community goals.

The Fusion Energy Division's **Nermin Uckan** has been appointed by the president of the American Physical Society to chair the selection committee for the John Dawson Excellence in Plasma Physics Research Award.

A paper co-authored by the Fusion Energy Division's **Masanori Murakami** has won the inaugural Nuclear Fusion Award from the International Atomic Energy Agency. The group of contributing authors includes M.R. Wade, formerly of ORNL and currently with General Atomics of San Diego. The lead author is T.C. Luce of General Atomics.

The Materials S&T Division's **Hua-Tay Lin** has been named the 2007 outstanding alumnus of Auburn University's Department of Materials Engineering in the Samuel Ginn College of Engineering.

New Staff Members

Janie McNabb Phillips, Human Resources Dir.
Gerald Ray Brackett, Cory William Fletcher and Tara N. Thompson, Neutron Scattering Science
Burl Warren Wells, Craft Resources
Mikhail Borisovich Krassovski and Sara S. Jawdy, Environmental Sciences
Lorenzo Fabris, Engineering Science & Technology
Gilbert Gregory Weigand, Computing & Computational Sciences
Janice Varner Hughes, Information Technology Services

Service Anniversaries

March 2007

60 years: J. W. Dennis, Logistical Services
45 years: James William Roddy, Nuclear Science & Technology; Barbara L. Littleton, Business & Information Services Dir.
40 years: Dan W. Ramey, Nuclear Science & Technology
35 years: Jack W. McNew, Craft Resources
30 years: Leonard P. Phillips Jr., Nuclear Science & Technology; Larry D. Phillips and James Samuel Goddard Jr., Engineering Science & Technology; Jimmy Steve Davis, Logistical Services; Marcia D. Whitson, Asset Mgt & Small Business Programs; Linda S. Burnett, Information Technology Services; Leonard E. Presley, Carl E. Conley and Richard A. Boody, Craft Resources; Tom T. McConnell, Nonreactor Nuclear Facilities; Saylor B. Hummel, Human Resources Dir.; Henry C. Ruth, Fabrication; Hu Foster Longmire, Materials Science and Technology; Kenneth W. Buchanan, NScD Neutron Facilities Development
25 years: William Paul Painter, Technology Transfer; Daniel G. O'Connor, Facilities Management; Gregory L. Kickendahl, NScD Research Reactors
20 years: David Andrew Denning, Craft Resources; Robert Howard Morris and Richard W. Reid, Computational Sciences & Engineering; Mark A. Buckner, Engineering Science & Technology; Eliot D. Specht, Materials Science and Technology; Dana Lynn Cox, Fabrication; Keith Thomas Sanford, Information Technology Services; Stan Cooper, Chemical Sciences; Mark H. Robbins, Communications & External Relations Dir.; Karen Ann Moore, Office of Counterintelligence

Volunteers prepare kits for K-2 students.



Nuclear S&T Division, Nonnuclear Facilities Division, Nuclear & Radiological Protection Division and Radiation Safety Information Computational Center volunteers prepare ecology science kits for area pupils. The project, in conjunction with Women in Nuclear and the American Nuclear Society, assembles a variety of experiment kits to interest the youngest students, in the K-2 range, in science. So far the program has five schools participating, a list that is expected to grow.

'ORNL kids' continue academic accolades

Children of ORNL staff members continue to excel in education-related activities.

Alice Gu, daughter of the Environmental Sciences Division's Baohua Gu and Xiangping Yin, has been named a semifinalist in the 2006-2007 Intel Science Talent Search. Alice has been mentored at ORNL by the Computer Science & Mathematics Division's Nagiza

Samatova and Tatiana Karpinets.

The son of the Computational Science & Engineering Division's Cyrus Smith has been named a Rhodes scholar. Brad Smith is one of 32 U.S. students selected to study at England's Oxford University. Brad, a summa cum laude graduate of Harvard University, will study comparative social policy.

Club ORNL: Hockey, horses, hiking

March 16, Alive after Five. The Knoxville Museum of Art's Alive after Five concert on March 16. Tickets will be offered at \$5 per person (kids 17 and under get in free). Ticket price includes a \$5 voucher for the KMA food service. Retirees interested in attending this and other Club ORNL events should contact Nancy Gray (graynl@ornl.gov or 576-9479). The featured band for the evening is Soul Connection.

March 31, Hockey - Nashville Predators vs. Dallas Stars. Tickets now on sale at the ORNL branch of the ORNL Federal Credit Union until all seats are sold. Tickets are \$25 per person, four per employee/retiree.

April 22, Keeneland Racing Trip. Strictly for grown-ups, cost of \$30 will cover bus ride, admission, racing program, and buffet in the Phoenix Room. Tickets are limited to two per employee-retiree, available for on-line sign-up from March 1 to April 2.

April 28-29, Charit Creek Lodge. Club ORNL has reserved Charit Creek Lodge in Big South Fork National River and Recreation Area for an overnight event on Saturday, April 28. The lodge is only accessible by horseback, foot, or mountain bike. Prices are \$40 per adult and \$30 for children under 10 years of age; participation is limited to 43. This price includes the room, dinner on Saturday night, and breakfast on Sunday morning. On-line sign-up begins on March 5 and will conclude on March 28. Payment in full should be sent to Liyuan Liang, 241-3933, 4500N, MS-6251, Room J-220.

May 17, Golf tournament. Details to be announced.

May 23, Car & motorcycle show. Details to be announced.

Interested in the most up-to-date Club ORNL News? Check out the club's Web page online via the ORNL home page. To gain access to the ORNL home page, one must first register in XCAMS by going to http://www.ornl.gov/adm/clubornl_signup.shtml. After receiving your XCAMS account and Club ORNL membership, retirees can then go directly to <https://www.ornl.gov/adm/clubornl>. Nancy Gray (576-9479; graynl@ornl.gov) is Club ORNL's point of contact for retirees.



Maturation

Continued from page 1
to \$60,000. Technology maturation funding is issued through a call for proposals in the fall with funds being awarded at the beginning of the new calendar year.

“Our royalty sharing policy allows us to spend up to 25 percent of our previous year’s royalties on Lab-wide maturation and 10 percent on division maturation projects,” says Casey Porto, director of technology transfer in ORNL’s Technology Transfer and Economic Development Directorate. “The purpose of tech maturation funding is to provide the ‘last dollar’ on achieving a commercial outcome such as a license.”

In the proposals, researchers need to describe the path to commercialization, providing evidence that the funding will secure a path to a commercial transaction such as a license for the technology. Proposed projects must include one or more existing patents or patent applications or copyrights because the funding is specifically not for creation of intellectual property. Reviewers look for existing commercial relationships and expressions of interest from potential licensees as validation of the commercial desirability of the technology.

In addition to the eight projects receiving royalty-funded technology maturation dollars, two additional projects were selected to receive privately funded tech transfer funds, part of a UT-Battelle program to nurture promising technologies into the marketplace.

Privately funded technology transfer, or PFTT, uses investment dollars from UT-Bat-

telle, as well as the University of Tennessee and Battelle individually, to advance the development of technologies that show particular commercialization promise. The funds are used to pay for things such as patenting, market research and prototype development



Weigh-In-Motion is one promising Lab technology that has been selected for maturation funding.

associated with bringing the technology to market, either through a license to an existing company or through a start-up firm spun out of the Laboratory.

Jennifer Caldwell, who arrived at ORNL late last year from Research Corporation Technologies, Inc., in Tuscon, Ariz., is now managing the PFTT program. In the five-year contract renewal with the Department of Energy, UT-Battelle has committed to spending \$3.5 million on PFTT. More than 50 inventions have been selected for PFTT funding so far, and a few of these inventions are also receiving PFTT funds for maturation proposals directed to commercialization.

The goal is to identify technologies and develop strategic plans for applications in the marketplace. For example, PFTT funds have been dedicated to maturing the superhydrophobic technology portfolio by funding the development of specific application methods for bonding superhydrophobic powder onto industrial products.

“In the case of this technology, the approach is to complement the inventor’s technology maturation plan with a commercial aspect that will provide the fastest adoption in the marketplace,” Jennifer says. “With PFTT we create and fund development with specific milestones that provide critical development steps for an early stage technology to attract commercial interest.”—*Larisa Brass* 



Reporter

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