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Technology Transfer Queen



**Lura Powell brings good
science to life at PNNL**

Technology Transfer

PNNL is one of only nine national labs and Lura Powell, its new director, is making sure its technological advances transfer into everyday life.

By Melissa O'Neil

When Lura Powell was a girl, she asked for a Gilbert chemistry set – instead of Barbie dolls. With her mother teaching junior high math and science and her late father practicing optometry, Powell was immersed in a world of science from the day she was born.

“At a young age, I knew I wanted to be a chemist,” Powell recalls.

It is no surprise then, that this scientist-turned-businesswoman is heading the state’s largest scientific think tank: Pacific Northwest National Laboratory (PNNL). From inventing the CD-ROM to countering bioterrorism, Tri-Cities-based PNNL is a behind-the-scenes source of inventions that affect daily life. And Powell is determined to merge her twin passions – science and business – by introducing PNNL’s scientific tools and services to the region’s business world.

“I want to make sure this lab is well-known, recognized, and accessed as a major resource in the Pacific Northwest,” she says. “I want to make stronger connections within the state and the region. Our mission is to provide a resource for the nation.”

Powell is director of PNNL, which is operated by Battelle for the U.S. Department of

Energy (DOE). With a Ph.D. in analytical chemistry and an impressive résumé as an administrator, Powell was the first woman to be named head of one of the nine DOE national laboratories when she took the post in spring 2000. Powell also is senior vice president of Battelle.

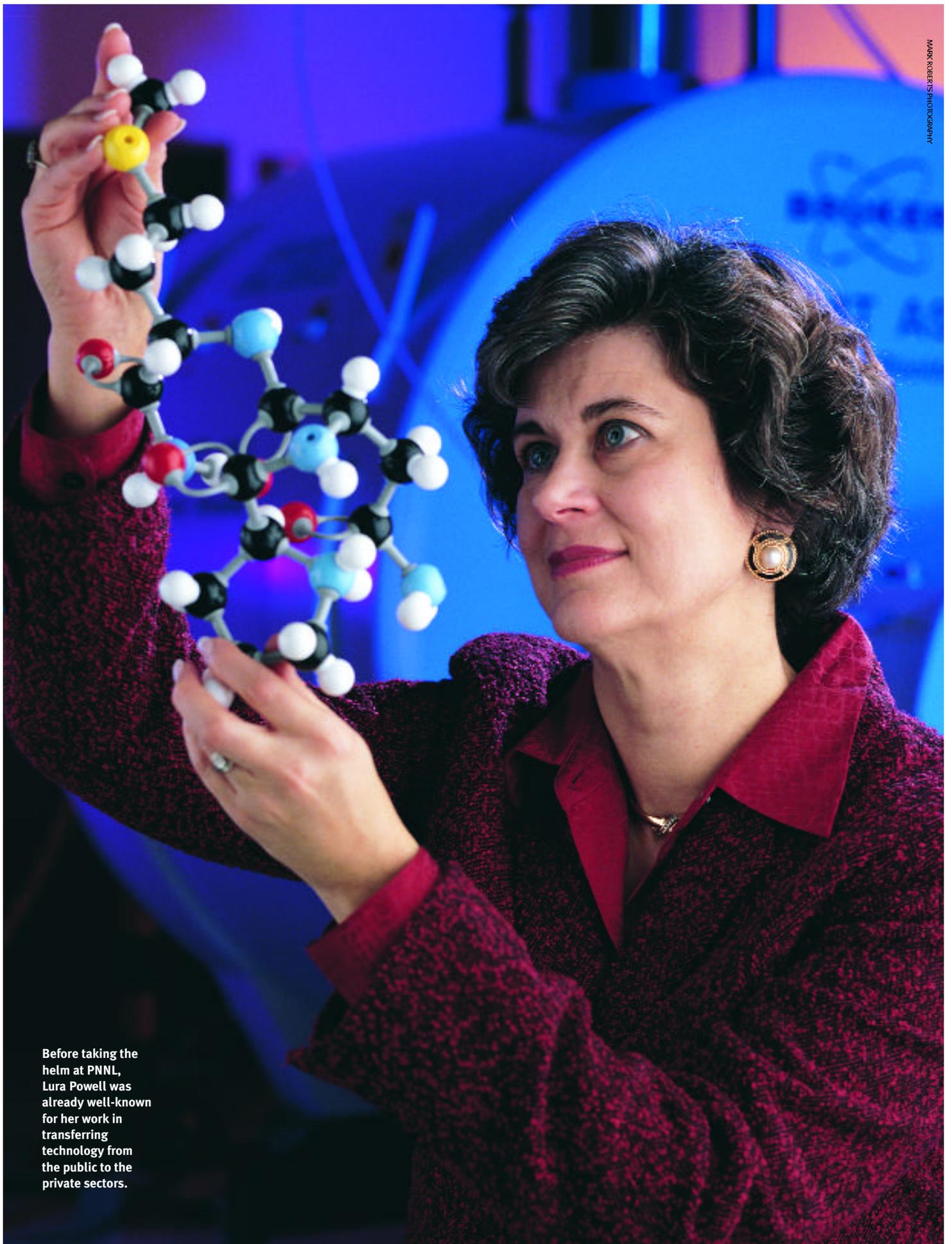
She’s known in the Tri-Cities as an aggressive businesswoman who understands science, can translate federal policy, values partnerships, appreciates innovation, and is a role model of the poise and hospitality she learned growing up back East.

Powell joined PNNL after a 27-year career with the National Institute of Standards and Technology (NIST). There, in 1995, she was named director of the Advanced Technology Program (ATP), which speeds along the development of technologies that show national benefits and commercial promise. Her ATP leadership earned her the U.S.

Department of Commerce’s gold medal in 1998. Previously, she had founded and built NIST’s biotechnology division, managing programs in DNA technologies, bioprocess engineering, biosensor technology, and structural biology—and receiving the Department of Commerce’s silver medal.

Powell’s career at the NIST prepared her for many challenges. During her tenure as the head of ATP, the program “became a major point of contention between President Clinton and the Republicans,” she recalls with a shudder at the stress. “When I took it over, it was being zeroed out. I stepped into this unbelievable fray. I felt like I had a target pinned to me. I learned a lot—the hard things I didn’t want to learn. I’m a stronger person. And the program beat the odds and lived.”

Her challenge at PNNL does not involve protecting the lab, since DOE last fall extended the Battelle operation contract for another



Before taking the helm at PNNL, Laura Powell was already well-known for her work in transferring technology from the public to the private sectors.

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five years. The challenge is sharing the lab's research.

PNNL's history has roots in secrecy. The 2-million-square-foot campus is next to DOE's Hanford site, where plutonium was created in World War II for the Nagasaki bomb and where thousands of people now are employed in one of the world's largest nuclear waste cleanup and environmental-restoration projects.

Battelle's laboratory was spun off from Hanford in 1965. In fact, a minimum of PNNL's work is spent on Hanford issues. Instead, the lab's scientists, including those at work in PNNL's Environmental Molecular Sciences Laboratory, are at the forefront of \$540 million worth of research into global climate change, salmon migration, fuel cells, nanotechnology, the human genome and proteomics, and countless other ventures. "We're too much of a best-kept secret,"

Powell says. "I don't want to be a secret. I want this lab to be on the map and to be accessed. It's hard to get the word out."

That means Powell is on a quest to invite industries to tap into PNNL's vast array of scientific knowledge and abilities. She points out that Battelle knows how to commercialize technology, and "this lab is the single biggest source of those technologies." For example, the CD-ROM was invented at PNNL.

"We really are multi-program," Powell says of the lab's range of skills, tools, and interests. Press releases generally describe PNNL as a research facility in the areas of the environment, energy, health, fundamental

sciences, and national security.

"Our national security [division] is really being tapped right now after what happened on September 11," Powell says. "We're identifying and developing strategies to counter bioterrorism. It wasn't at the front of the list at the time." Currently, nearly 40 percent of the work at PNNL is related to national security.

PNNL employs 3,650 people, with a payroll, including benefits, of \$294.6 million. All but 150 employees work in Richland. Others are at PNNL's marine sciences lab in Sequim and at small offices in Seattle, Tacoma, Portland, and Washington, D.C.

Because of PNNL, the Tri-Cities once laid claim to having the most Ph.D.s per capita of any metro area in the nation. While that Cold

"We're too much of a best-kept secret. I don't want to be a secret."

— Lura Powell

Partnerships for Progress

PNNL is quickly transferring technological breakthroughs into the private sector.

Since 1965, PNNL has received more than 900 U.S. and foreign patents for developing products and research in many different fields that impact consumers every day. Currently, researchers are working on the super-plastic forming of metals that will be used in building more durable, lightweight, and energy-efficient cars.



Pacific Northwest National Laboratory (PNNL) received 38 U.S. patents and 11 foreign patents during fiscal 2001 alone.

Since PNNL's inception in 1965, work conducted there has received 926 U.S. and foreign patents.

Scientists at the Richland-based lab have about 2,000 experiments in progress, each worthy of its own story. The developments and the awards keep PNNL's public-relations staff hopping.

PNNL director Lura Powell is intimately familiar with many of the programs, but declines to pick a favorite.

"It's like choosing among your children," she says. "We do a wide range of exciting stuff."

Recent examples of projects, and some finished products, include:

- The first sky-based study of the Puget Sound region's air quality, which gathers air chemistry data to look at ozone and particulates. Last August's research flights were led by PNNL with the Environmental Protection Agency, Washington State University, the University of Washington, the Puget Sound Clean Air Agency, the state Department of

PNNL



PNNL's Tri-Cities campus is Washington's brain trust with 700 Ph.D.-level scientists.

War-era bragging point might be hard to prove today, nearly 700 PNNL staff members have doctorates and another 700 have earned master's degrees. About 600 more employees have training as scientists, engineers, or technicians. The remaining workforce ranges from clerical support to nontechnical posts. Another 880 students, faculty members, and postgraduates participate annually in PNNL

intern and education programs.

The U.S. Department of Energy sponsors about 70 percent of PNNL's research. About 10 percent is supported by private industry and foreign governments. The remainder is sponsored by the Department of Defense, the Environmental Protection Agency, the National Science Foundation, the National Aeronautics and Space Administration, the Nuclear Regulatory Commission, and the National Institutes of Health.

As far as Powell is concerned, they're all partnerships.

"I'm big on partnerships," she says. "Observe the value you get from federal-university partnerships and from federal-industry partnerships. If you can combine all three, it's even better."

Powell has a strategy to make the region's businesses more familiar with PNNL. She serves on the Washington Roundtable board of directors and gave the group a tour of the laboratory in June 2001, an experience that



PNNL

(Left) PNNL scientists were the first to develop sky-based studies of the Puget Sound's air quality, using special equipment on airplanes to measure ozone and particulate in the air. (Below) Scientists are using new technology to learn more about how better to protect local salmon runs.

Ecology, and Environment Canada.

- A wastewater treatment unit for agricultural sewage lagoons that reduces the amount of cow manure getting into rivers. The unit, called InStream, is manufactured in Oklahoma, but Tri-Cities business Soil Search has licensed the right to sell InStream at dairies in six states.

- "Information visualization" computer programs that help analyze data such as text, maps, and video; display it in more understandable themes; and expose unseen patterns. PNNL's software was developed to help the U.S. intelligence community cope with infor-



PNNL

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reportedly intrigued Roundtable members and certainly thrilled Tri-Cities business leaders.

Powell also is on boards for the Washington Technology Alliance, the Industrial Research Institute's Federal Government Liaison Council, the Pacific Science Center, DOE's Nuclear Energy Research Advisory Council, and the Fred Hutchinson Cancer Research Center. At home, her community leadership includes Richland's hospital, Kadlec Medical Center, United Way, Junior Achievement, the Tri-City Industrial Development Council (TRIDEC), and a research-and-development task force initiated by TRIDEC to envision and achieve a plan for the area. She credits her community service with providing the management experience that helped advance her career.

Moving to the West Coast, however, wasn't in Powell's personal strategy until a couple years ago.

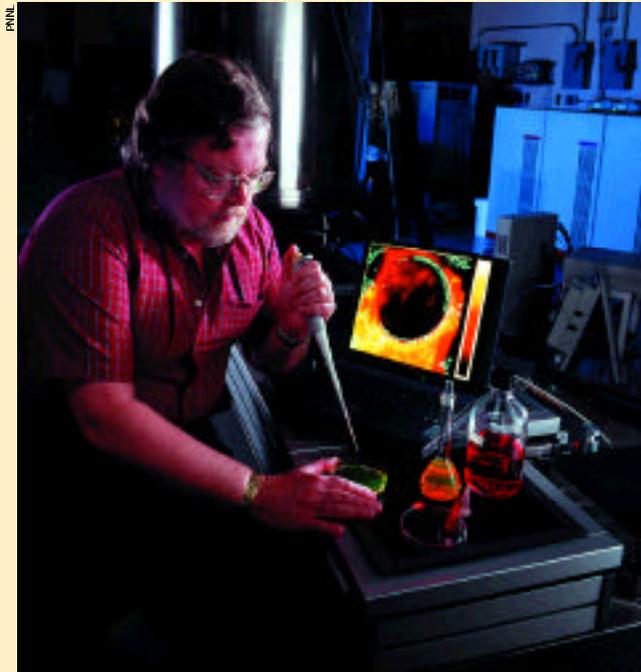
"I retired from the federal government and went into private consulting. A head hunter sent me a job description and I said, 'I can do that,'" she recalls. "Once I saw the lab and I saw the area, I was sold. I felt it was going to be a good environment for my kids and a good opportunity for me.

"It's an opportunity to see things through from discovery to the marketplace. This is one of the few places I could go in the world and have that opportunity."

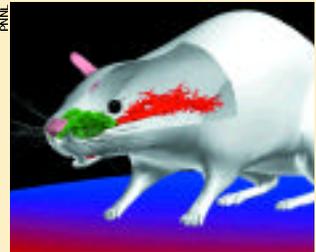


MARK ROBERTS PHOTOGRAPHY

Laura Powell has quickly stepped into her leadership role in the Tri-Cities community.



PNNL



PNNL

(Above) PNNL scientists are using virtual computer models to better understand how pollutants affect a rat's internal organs. (Left) Physicist Robert Wind won a 2001 *Discover* magazine innovation award for developing a special optical microscope that will aid in cellular research.

mation overload and has been used to help police detectives solve serial killings.

- A bioactive coating that makes bone implants last longer.
- Tools to track, detect, and defend against hacker attacks on computer systems.
- Devices that detect evidence of

nuclear explosions, used to verify international compliance with the Comprehensive Nuclear Test Ban Treaty.

- A detector that senses when a knife on a food-processing line needs to be replaced, ensuring quality and reducing waste. The detector is in use at Lamb-Weston potato-processing plants in eastern Washington and in Europe.

- Construction of durable, lightweight, energy-efficient vehicles. In conjunction with several auto manufacturers, PNNL created the Northwest Alliance for Transportation Technologies in 1996 to explore new vehicle designs.

Her husband, Art King, to whom she has been married since May 1982, encouraged her. "He pushed me to take the job, saying, 'It's exactly the right job for you.'"

King gave up his manufacturer's representative business to move west.

"He took a year to get the kids settled and the house in order," Powell says, referring to their daughters, ages 12 and 17. "He's looking at part-time work and has gotten very active in volunteering at the food bank, as a tutor, on the truancy board. He's found that very fulfilling."

At home, the family enjoys outdoor activities such as hiking and building a waterfall in their yard.

Undoubtedly comfortable in a suit in high-powered settings, Powell is known to wear more appropriate laboratory attire—aka jeans—in her office. She does admit to wishing the Tri-Cities had a Talbots women's classic clothing store and a direct flight to Washington, D.C., but otherwise she doesn't find the mid-size metro area lacking.

"If people really want to live in big cities, they're not going to come here, but I love the lack of traffic jams, the lack of humidity. There are two or three conflicting [arts and community] things we want to do each weekend," Powell gushes. Her list of amenities includes the shrub-steppe landscape, golf, sun, rivers, wineries, mild winters, and a welcoming community. "We need to get people out here to see it. I was shocked."

The PNNL and NIST campuses are similar, with open space and ponds. But at NIST,

"there weren't any treeless mountains like Rattlesnake," she says of the bald peak outside her office window. "That's momentous, that's breathtaking—you don't have anything like that back East."

Powell also appreciates the PNNL work culture: "People not only are doing excellent science but also are really devoted to their jobs."

She fondly remembers her days as a working scientist. The last atomic weight measurement she took was in 1984, just before her first daughter was born and Powell went into management.

"I get excited when I go out to the lab and see the nifty stuff they're doing and how excited they get about it," she says, her eyes brightening with the zeal of discovery. "I really love managing and leading the lab."

"I feel part of it by talking to scientists. I like helping bring attention to their work in my own way."

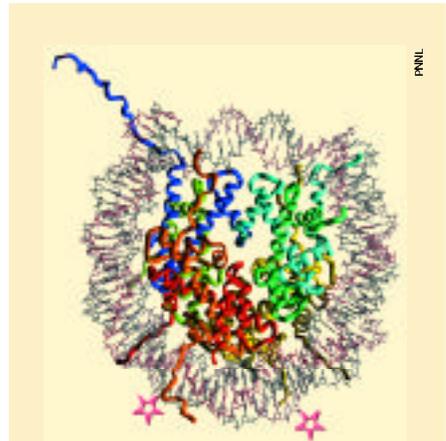
"I'm selling good science."

Melissa O'Neil is a Richland-based freelance writer.

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PNNL scientists are studying the structure of DNA.



Engineer Randy Hansen tests a new landmine detector.

- A land-mine detection system that's portable, comparatively inexpensive, and easy to operate. The creator, a PNNL physicist, received a \$100,000 fellowship from the Christopher Columbus Foundation last summer to further develop the Timed Neutron Detector.

- A three-dimensional computer model of human lungs that predicts how pollutants affect the respiratory system.

- A buoy with cell-phone technology and interchangeable sensors to monitor and record water quality.

- The Long-Range Semi-Passive Radio Frequency Identification System, now being marketed by the Wave ID company in Richland. The radio-frequency tags can identify, locate, and even determine the condition of an item. The system reduces time spent conducting an inventory, especially for commodities such as perishable foods and blood plasma, and can be used to keep track of military equipment and personnel in the field.

- The combined optical and magnetic resonance microscope, used to study cellular activity such as cancer development and tumor death. The microscope won the 2001 Discover magazine Innovation Award in the health category.

In addition, using PNNL's Environmental Molecular Sciences Laboratory, scientists are preparing to explore proteomics. Proteomics examines the role and interactions of proteins in an organism—specifically in the genome, which is what carries DNA. It'll be like lifting the hood of a car and viewing the inner work-



ings of the engine. Proteomics is expected to have a long-term effect on biological and biomedical research. —Melissa O'Neill

They are also developing machines such as the molecular beam epitaxy system (left) used to understand environmental restoration and

waste remediation. Experiments (above) may show how to clean up soil contaminated with heavy metals and radiation.

