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Breakthroughs
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Northwest

Richland, Washington

February 2004

Wearable air conditioners: Hot new microtechnology keeps GIs cool

Personal protective suits guard soldiers from chemical and biological weapons, yet extreme heat inside that gear poses a different threat. Without portable cooling technology to prevent heat exhaustion, suits meant to save lives can incapacitate soldiers in just minutes.

Researchers at Pacific Northwest National Laboratory are developing heat-actuated lightweight and compact cooling technology capable of sustaining manageable temperatures within the protective garb for several hours at a time.

The principles of microtechnology and the high rates of heat and mass transfer at this miniature scale—about the thickness of the human hair—have enabled portable cooling systems predicted to weigh three to four pounds. The system chills water which flows through a soldier's vest and is capable of providing relief for up to six hours. Instead of using electricity to power a mechanical compressor, heat from burning fuel is used to power the cooling, thereby replacing bulky, heavy batteries with much lighter fuels. Microtechnology, which can reduce the size and weight of a system based on traditional technology by five to 10 times, is the key to making this system portable.

For more information on this microtechnology visit PNNL's Web site at <http://www.pnl.gov/news/2004/04-07.htm>.

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Global warming to dry out Western mountains



Global warming will diminish up to 70 percent of the water stored as snow in the Western United States in the coastal mountains over the next 50 years, according to a new climate change model released by Pacific Northwest National Laboratory.

The reduction in Western mountain snow cover, from the Sierra Nevada range that feeds California in the south to the snowcapped volcanic peaks of the Cascades in the Pacific Northwest, will lead to increased fall and winter flooding, and severe spring and summer drought that will play havoc with the West's agriculture, fisheries and hydropower industry.

"And this is a *best case* scenario," said the forecast's chief modeler, L. Ruby Leung, a scientist at PNNL. Full results of her study will appear soon in the journal *Climatic Change*. Leung's results are based on an assumption of a 1 percent annual increase in the rate of greenhouse gas concentrations through the year 2100, little change in precipitation and an average temperature increase of 1.5 to 2 degrees centigrade through the mid-21st century. The result: more winter precipitation falling as rain instead of snow, pushing the snowline in the mountains up from 3,000 feet to higher than 4,000 feet.

For more information on Leung's study, see PNNL's Web site at <http://www.pnl.gov/news/2004/04-03.htm>.

Scientists shine at AAAS '04 in Seattle



On Friday night, the visiting Singing Scientists barbershop quartet was a hit when they sang the Periodic Table song during the exhibit hall's opening reception.

Nearly 25 Pacific Northwest National Laboratory scientists participated in the annual meeting of the American Association for the Advancement of Science (AAAS), one of the world's largest science conferences, held in Seattle over Presidents' Day weekend. Researchers shared results and expertise in areas as diverse as climate change, fuel cells, power grid reliability, proteomics and microtechnology.

The Laboratory's multi-program expertise was evident in the topics presented by PNNL scientists. For example, Barbara Seiders, PNNL biodefense program manager, spoke about the difficulties of finding weapons of mass destruction and the history of that struggle in Iraq. PNNL scientist Karin Rodland organized a seminar on proteomics, providing an opportunity for PNNL scientists to share their cutting-edge, innovative work in plasma proteins.

Nine posters by students involved in PNNL education programs were displayed at the conference with study topics ranging from tomatoes to

particulate matter in the atmosphere in Eastern Washington.

Battelle, which operates PNNL for the U.S. Department of Energy, was a primary sponsor of AAAS this year. For more information about AAAS, see PNNL's Web site at <http://www.pnl.gov/main/news/aaasvisitors.html>.

Laboratory honored for transferring technology

Pacific Northwest National Laboratory has been recognized for transferring technologies that will enhance drug discovery and biotechnology, treat cancer with fewer side effects and advance the capabilities of sophisticated analytical instruments for biological and biomedical research.

The Federal Laboratory Consortium is honoring PNNL with three 2004 Excellence in Technology Transfer Awards for the laboratory's Electrodynamic Ion Funnel, alpha particle immunotherapy for treating leukemia and solid-tumor metastases, and Inductively Coupled Plasma/Mass Spectrometry Collision/Reaction Cell Technology.

The PNNL technologies were among 24 recognized nationwide by the FLC this year. With 57 awards, PNNL has been honored by the FLC more than any other federal laboratory since the recognition program began in 1984. The FLC recognizes federal laboratories and their employees who have made significant contributions in transferring important federally funded technology into the private sector. The FLC is comprised of more than 700 federal laboratories and centers.

PNNL scientist to chair nuclear standards committee

Pacific Northwest National Laboratory's Gary L. Smith has been elected to chair an influential committee that sets international regulations for the nuclear fuel cycle.

The committee, part of ASTM International, formerly the American Society for Testing and Materials, develops standards to facilitate the commerce, safety, worker, public and environmental health, and regulatory compliance for the nuclear fuel cycle. The committee sets standards for spent nuclear fuel, waste materials and waste packaging and storage for both the commercial nuclear industry and the defense community.

As chair of committee C26, Smith will preside over all committee meetings, work with the executive committee to appoint and approve subcommittee chairs, and serve on 13 subcommittees. Smith is a Fellow of ASTM International and has spent much of his career researching nuclear waste and waste vitrification.



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This publication is available online at <http://www.pnl.gov/sharingscience>

RL-P00-007 Feb. 21, 2004