

LAWRENCE LIVERMORE REPORT

A weekly collection of scientific and technological achievements from Lawrence Livermore National Laboratory: Sept. 23-28, 2009.

Visalia Superfund cleanup hits the mark in *SF Business Times*



Contaminant floating on water in the dissolved air-flotation-tank (at lower right). Dissolved air forms bubbles that capture and lift free-product contaminant to the surface of the separator.

The Laboratory's technology was instrumental in cleaning up Southern California Edison's Visalia Pole Yard, which was scheduled to be taken off the Environmental Protection Agency's Superfund list last week, a century earlier than expected.

LLNL used dynamic underground stripping (DUS), a Lab-developed steam-cleaning technology that not only cleaned the site more than 100 years sooner than originally estimated, but also saved millions of dollars.

Southern California Edison had used the Visalia site for 80 years to treat utility poles by dipping them into creosote or pentachlorophenol, which by the 1970s, had seeped into the subsurface soil and groundwater to depths of approximately 100 feet (30 meters). The site was one of the first Superfund sites, part of a federal government cleanup program for highly toxic places. Superfund sites are on the National Priorities List of the Environmental Protection Agency because they may seriously threaten public health.

Twenty years later, Southern California Edison was looking for a faster and more efficient way to treat the soil and groundwater. And that's where Livermore geophysicists Robin Newmark and Roger Aines entered the scene. The duo, along with LLNL and UC Berkeley colleagues, had developed DUS, which was first successfully used in the cleanup of an underground gasoline spill at Livermore Lab in 1993.

To read more, go to

<http://sanfrancisco.bizjournals.com/sanfrancisco/stories/2009/09/21/daily5.html>

Climate model report recently featured in *Science's* Editor's Choice



One model-one vote is a criticism of recent climate change simulations.

To address the issue, Livermore scientists used 22 climate models to investigate changes in the water vapor content over the oceans of the worlds. They discovered that an increase in water vapor is directly linked to human activities.

And it didn't matter which climate model they used. In other words, the model quality didn't affect the ability to identify human effects on atmospheric water vapor.

The research recently appeared in the *Proceedings of the National Academy of Sciences* but was also featured in *Science Magazine*.

To read more, go to <http://www.sciencemag.org/content/vol325/issue5946/twil.dtl>

***Pittsburgh Tribune-Review* goes underground with coal burning**



The Majuba underground coal gasification project in South Africa is producing high-quality "syngas" for power generation.

Synthetic gas produced by burning coal reserves could become part of the United States' energy mix if private firms are willing to spend the money on a plant, overcome environmental hurdles and natural gas prices don't hit rock bottom.

Underground coal gasification -- burning coal buried about 1,500 feet underground and capturing the gases -- has the potential to provide electricity by powering natural-gas-powered turbines, to become a substitute for natural gas and to be used in jet and diesel fuel.

The technology -- drilling one hole into the coal seam to introduce oxygen, which is ignited to burn the coal into char, and another hole to direct the gases released by combustion into an above-ground plant -- has been available for decades, but it wasn't pursued because natural gas was cheap.

However, according to Julio Friedmann, leader of the Lab's Carbon Management Program who spoke to the *Pittsburgh Tribune*, underground coal gasification will never compete with low-cost natural gas.

"If you have natural gas at (a production cost of) \$1.50 per million cubic foot, you will never do underground coal gasification," Friedman said.

To read more, go to

http://pittsburghlive.com/x/pittsburghtrib/news/cityregion/s_644152.html

Clusters and clusters of supercomputers



In 1992, the Department of Energy's National Nuclear Security Administration (NNSA) was tasked to maintain the country's nuclear weapon deterrent via computing

simulations. As a result, LLNL and its two sister labs, at Los Alamos and Sandia, became the recipients of some of the most muscular computing hardware in the world, according to a recent article in *HPC wire*.

Today, these institutions are at the forefront of supercomputing expertise, both hardware and software. Because the weapons simulation applications are always looking to achieve higher resolution, higher fidelity, and full-system modeling, there is an ongoing demand for ever-more powerful capability-class supercomputers.

In a couple of years, the Laboratory is scheduled to deploy "Sequoia," a 20-petaflop (quadrillionth floating operations per second) IBM Blue Gene/Q machine, and a likely contender for the top supercomputer in 2011. Sequoia's predecessor, "Dawn," is a 500-teraflop Blue Gene/P machine installed earlier this year at Livermore.

But according to Mike McCoy, who heads of Livermore's Scientific Computing and Communications Department, it's not all about these elite capability machines. He says 10 percent to 30 percent of the computational resources at the Lab are devoted to capacity systems, that is, commodity HPC Linux clusters. The reason is simple. There is a lot of computing to be done, and time on the expensive capability systems is dear.

To read more, go to <http://www.hpcwire.com/features/Lawrence-Livermore-Builds-Stable-of-Workhorse-Clusters-60943337.html>

LLNS 2009 community gift program recipients



At left, Lab Director and LLNS President George Miller addresses the recipients.

Lawrence Livermore National Security, LLC (LLNS), the management company for the Laboratory, has announced the recipients for the 2009 LLNS community gift program.

These gifts, totaling \$100,000, reflect LLNS' commitment to local communities and were distributed last week at the LLNS office in Livermore.

LLNS received 73 applications totaling nearly \$750,000 in requests. Twenty-one applications were selected for awards through a committee review process. The majority of these awards serve children in the Tri-Valley and San Joaquin County, with a focus on science and math education and cultural arts.

"We thank all of the agencies for the valuable services they provide in our Tri-Valley community. It's through their hard work and persistent effort that the entire region benefits," said George Miller, LLNS president and LLNL director. "LLNS is committed to being a good neighbor and is providing a direct investment in the future of the community."

To see a list of the winners, go to <http://www.llnslc.com/communityGiving/gifts.asp>

Latest *Newsline* available



Newsline provides the latest Lab research and operations news. See the most recent issue at <https://newsline.llnl.gov>

Photo of the week



I smell honey: A honey bee pollinates a drought-tolerant plant (Mexican sage) at LLNL. The Lab is trying to conserve water by planting California native and drought-tolerant shrubs on the site.

LLNL is managed by Lawrence Livermore National Security, LLC, for the U.S. Department of Energy's National Nuclear Security Administration.

LLNL applies and advances science and technology to help ensure national security and global stability. Through multi-disciplinary research and development, with particular expertise in high-energy-density physics, laser science, high-performance computing and science/engineering at the nanometer/subpicosecond scale, LLNL innovations improve security, meet energy and environmental needs and strengthen U.S. economic competitiveness. The Laboratory also partners with other research institutions, universities and industry to bring the full weight of the nation's science and technology community to bear on solving problems of national importance.

To send input to the Livermore Lab Report, send e-mail <mailto:labreport@llnl.gov>.

The Livermore Lab Report archive is available at:
https://publicaffairs.llnl.gov/news/lab_report/2009index.html