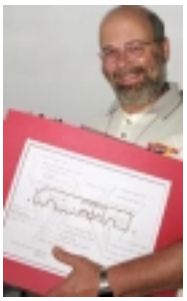

Mara's vehicle smooths potholes.

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DOE Pulse

Science and Technology Highlights from the DOE National Laboratories

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Research Highlights . . .

DOE technologies on view in national park

Zion National Park in Utah has a new energy efficient visitors center that boasts cutting edge renewable and energy efficiency technologies thanks to DOE's National Renewable Energy Laboratory researchers Ron Judkoff and Paul Torcellini who provided energy consultation services to the National Park Service for the project. The sustainable, 7600 sq. ft. building was designed to have low impact on the environment and offset the need for traditional electrical power. The building's heat comes from a Trombe wall that captures the sun's warmth; lighting comes primarily from daylight through clerestory windows; photovoltaics provide much of the building's electricity; and natural ventilation keeps the building cool.

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NETL hosts particulate research

In June 1999 DOE's National Energy Technology Laboratory established a state-of-the-art ambient-air fine-particulate monitoring station at its Pittsburgh site. The station is used to study fine particles with an aerodynamic diameter of 2.5 microns and less. Beginning in July, scientists from Battelle's Atmospheric Science and Applied Technology Division will use NETL's sampling station to conduct an EPA funded project entitled "Verification of Ambient Air Fine Particulate Monitors." During the test period, advanced air monitoring instrumentation from various manufacturers will be co-located at NETL. NETL will benefit from additional advanced scientific data on fine particles in the Upper Ohio Valley.

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Plasma focusing of a positron beam — first ever

The Plasma Lens Collaboration at the DOE's Stanford Linear Accelerator Center (SLAC) achieved something new. It recently focussed a positron beam (antimatter of electron) by means of a plasma lens. This is the first example of focussing an antimatter beam with matter. In the future, a plasma lens located at the interaction point inside a detector could focus both the electron and positron beam, reducing the beam spot size and increasing the luminosity, perhaps by an order of magnitude. These may be important considerations in the design of the next generation of accelerators.

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Whendunit can lead us to whodunit

Knowing when a crime victim died can help convict the killer, and researchers at DOE's Oak Ridge National Laboratory are developing a system that could help justice prevail. Working with the University of Tennessee's Anthropological Research Facility, they are examining time-dependent chemical and biological markers in hopes of gaining a better understanding of the cadaver decay process. Analyses of decay rates of different organ tissues would be applied toward computational models. The goal is to develop an instrument that could be waved over a body to determine the time since death.

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DOE Pulse highlights work being done at the Department of Energy's national laboratories. DOE's laboratories house world-class facilities where more than 30,000 scientists and engineers perform cutting-edge research spanning DOE's science, energy, national security and environmental quality missions. ***DOE Pulse*** (www.ornl.gov/news/pulse/) is distributed every two weeks. For more information, please contact Jeff Sherwood (jeff.sherwood@hq.doe.gov, 202-586-5806).

Research consortium will advance biobased industry in Midwest

Scientists from six institutions, including DOE's Argonne National Laboratory and Ames Laboratory, have formed a consortium that will conduct research and technology transfer on biobased products and energy.

Other members of the Midwest Consortium for Sustainable Biobased Products and Bioenergy are Iowa State University in Ames; University of Illinois, Urbana-Champaign; Michigan State University, East Lansing; and Purdue University, West Lafayette, Ind.

Argonne has a long-standing research program in biobased chemistry and has won several environmental awards for its development of a technology that will allow millions of pounds of toxic industrial solvents to be replaced by an environmentally friendly solvent. The technology can sufficiently reduce the cost of the environmentally benign solvent ethyl lactate to make it competitive in the marketplace against toxic solvents.

Argonne also is developing new ways of making large-volume industrial chemicals and commercial feedstocks from renewable and agricultural processes instead of from fossil fuels. America's agricultural industry could be revitalized by expanding market demand for farm and forestry products, while the chemical industry would benefit from less costly feedstocks.

The Midwest Consortium for Sustainable Biobased Products and Bioenergy conducts research and technology transfer on biobased products and energy.

"We can envision a major new industry which will depend on agriculture instead of petroleum with products which are safe not only to use, but also to produce," said Jim Frank, Argonne bioengineer and leader of Argonne's Chemical and Biological Technology Section. "This industry can be based in the Midwest if we can develop the economic, intellectual and political capital to make it happen. The consortium is an important step in that direction."

Bioproducts and bioenergy are made from renewable resources such as plants.

The consortium will provide a broad-based, multidisciplinary approach to biobased research, supporting a federal initiative calling for a tripling of the nation's use of biobased products and bioenergy by the year 2010. The administration proposed an increase in funding for a biobased chemicals and energy program to be led by the DOE and the U.S. Department of Agriculture.

The Midwestern consortium is designed to develop the necessary resources to integrate technologies, build technical infrastructures and link the private and public partners who will bring biobased chemicals to commercial reality.

Submitted by DOE's Argonne National Laboratory

Rapid Road Repair Vehicle would fix potholes on the fly

As Leo Mara inched along a bumpy road past a road-repair crew on his way to work at Sandia National Laboratories' California site a couple of years ago, he dreamed of a bus-sized vehicle that would fix potholes as it drove over them.

Leo Mara

That dream became his first patented invention and now has won him a *Discover* Award for technological innovation, in the Transportation category.

Mara's Greyhound bus-size Rapid Road Repair Vehicle incorporates several aspects of his background: He designs and programs data acquisition and control systems at the DOE lab, and previously worked for a trailer manufacturer in Connecticut, where harsh weather hastens road aging. He merged his industrial and high-tech experiences when conceiving the plan, and also incorporated a co-worker's chemical expertise on adding a rapidly congealing repair mixture to the scheme.

The vehicle would examine the road surface from scanners and clean any anomalies with high-pressure air and vacuum up debris. On-board image processing would determine if an object is a hole, bump, manhole cover, or crack. Then a phalanx of nozzles would pass over and deliver filling material, such as aggregate and fast-drying patch material or sealer. The mixture would be tamped into place, dusted with grit to provide traction, and vacuumed. Finally, another row of scanners would check the quality of the repair.

Under ideal conditions, Mara says, the vehicle could patch roads at up to 35 miles per hour, although he envisions a more sedate pace. But, he says, "Even at 10 miles per hour, can you imagine patching 10 miles of road in an hour? That's absolutely incredible."

Submitted by DOE's Sandia National Laboratories