



# Research Flash

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## From the Director

### Alaska Energy Technology Development Laboratory (AETDL) joins INE

For two years, AETDL has existed on the Fairbanks campus, directed by Vice Provost for Research Dr. Ted DeLaca. On 12 September 2003, management of this research program moved to INE (which supplied business office support already, as the Provost's office did not have this capability). INE faculty Dr. Dennis Witmer has been Director of AETDL and will continue in this role.

This program, funded via the National Energy Technology Lab (NETL) of the Dept. of Energy (DoE), focuses primarily on fossil energy research. Presently AETDL has \$2.5 million in funded research projects; \$1.2 million is spent here at UAF while another \$1.3 million goes to external contractors. One of the hurdles INE must face now is generating a 25% cost share (based on a total of \$2.5 million), or roughly \$625,000. Under present DoE rules, this cost share is a minimum assigned to each project. We also seek to establish funding with DoE for other energy-related projects, such as energy efficiency.

One goal is to build our faculty in the energy field so that the amount of outside contracting can be reduced. INE looks forward to this challenge, and to the role that UAF can play in addressing energy-related research needs in Alaska and other arctic communities

— Douglas L. Kane

[www.uaf.edu/ine/index.html](http://www.uaf.edu/ine/index.html)

## Providing research and solutions for the world's cold regions

### Newly Funded Projects

#### The Water Team

In most Alaskan villages, access to clean drinking water is not something people take for granted. Although state and federal programs have improved sanitation in many villages, some communities may never have access to piped water and sewer systems. In many communities, untreated water is stored in the home in unlined, open storage containers that are easily contaminated by disease-causing bacteria.

This project integrates research, education and outreach by combining efforts of the INE Water and Environmental Research Center, the Cooperative Extension Service and the local Tribal and City Councils. This team seeks to mesh traditional subsistence ways, healthy lifestyles, and new approaches to achieving safe drinking water for rural Alaskans.

UAF PIs Dan White, Malcolm Ford, Silke Schiewer, and Dave Barnes will work with the Tribal and City Councils of Eek, located in the Yukon-Kuskokwim delta region, to develop a model by which underserved communities all over Alaska can protect their water sources and improve sanitation in the home.

New approaches to improving sanitation could include treating traditional water sources (ice and snow melt, rainwater catchments, springs) in safe and culturally consistent ways. The team also seeks to improve health in these communities by identifying and publishing common sanitation problems that encourage disease and environmental degradation, and by making engineering recommendations to improve water sanitation. "Communities at Risk: Protecting Family Drinking Water in Rural Alaska" (\$598,182, 36 months).

#### Juiced-Up Power Courses

Hybrid cars, car stereos, electronic ignitions, laptops, palm pilots, electric wheelchairs, reliable power grids: Power electronics converters and electric drives make such tools ubiquitous in our lives. But just as these strategically important fields of electrical engineering are expanding, students are losing interest in them. Four universities – UAF, Illinois Institute of Technology, Montana State, and University of North Dakota are combining resources to improve education in these fields through adapting new materials, including more laboratory experiences for students, and new educational practices first developed at the University of Minnesota.

As part of this project, PIs Richard Wies and Seta Bogosyan will revitalize UAF Electrical Engineering courses with state-of-the-art labs and exciting class material. These classes will be designed to serve the needs of working professionals who want more formal training as well as more traditional undergraduate students. Ultimately, Wies and Bogosyan will provide industry in Alaska – and all over the country – with better-trained engineers in a growing field.

"Collaborative Research: A Novel Approach to Improving Power Electronics and Electric Drive Courses, Curriculum and Laboratories: Multi-University Adaptation and Implementation" is an NSF-funded project (\$43,448, 12 mos).



The Village of Eek, Alaska.



PI Richard Wies in a lab slated for new equipment.



## Engineers Without Frontiers

Thanks to senior Civil Engineering Students Peter Brown and Andrew Eklund, UAF will host a new student chapter of Engineers Without Frontiers (EWF), the 13<sup>th</sup> chapter in the nation. EWF will be welcoming new members and making new plans this fall, under the guidance of Environmental Engineering Assistant Professor Paras Trivedi.

EWF-USA grew from the Canadian volunteer organization Engineers without Borders, started in 1999 by students at the University of Waterloo. EWF and EWB are based on the same principles as the Nobel-prize winning Doctors without Borders aid program. Engineers and interns form partnerships with community members in developing countries, where they work together to identify and solve technology-based challenges. EWF-USA has more than 300 members at twenty universities across the United States.

EWF gives graduate and undergraduate students opportunities to participate in interdisciplinary projects that combine research and civic service. It is an ideal forum for students to further their technical knowledge through practical application. Trivedi looks forward to his role as faculty advisor, noting, "What I would really like to see come out of this program is for students to grow beyond academia, and connect with international communities."

Brown and Eklund hope to attend the EWF-USA first national conference, "Bridging the Divide," to be hosted by Cornell University in Ithaca, NY, from September 17-20. "Ideally this conference will teach us the secrets of running a successful chapter," said Peter Brown, "which will enable us to make the UAF chapter one that participates at the same level as chapters at MIT and Cornell." To learn more about EWF, visit <http://www.EWF-USA.org> or contact Peter or Andrew, at 474-5054.



## INE On the Road

**Congratulations to graduate student Christian Psoch**, who won 2<sup>nd</sup> place for his poster, "Fouling Reduction by Air Sparging in Synthetic Waste-water Filtration," at the 14<sup>th</sup> Annual Meeting of the North American Membrane Society (NAMS), at Jackson Hole, WY, 17-21 May 2003.

Dennis Witmer, INE researcher and Director of the Arctic Energy Technology Development Lab (AETDL), teamed up with Brent Sheets, Regional Manager of the NETL Arctic Energy Office, to present an update to the public on current projects at the Fairbanks Chamber of Commerce, 19 August 2003. Witmer spoke on fuel cells and alternative energy projects, and Sheets, on oil and gas energy.

In May 2003, INE/CEE faculty Bob Perkins spent three weeks in the city of Khabarovsk, in the Russian Far East, teaching Advanced Project Management to Russian engineering faculty. The American Russian Center (ARC), located at UAA, sponsored the course. The ARC trains entrepreneurs, business managers and government leaders through grants from the United States Agency for International Development (USAID) and other U.S. agencies. ARC promotes the transition of the Russian Far East to democracy and a free market economy.

## INE Publications

Ma, Haitao, Butcher, Eric, and Bueler, Ed. 2003. "Chebyshev Expansion of Linear and Piecewise Linear Dynamic Systems with Time Delay and Periodic Coefficients Under Control Excitations," *Journal of Dynamic Systems, Measurement, and Control*, 25, 236-243.

Psoch, Christian, and Schiewer, Silke. 2003. "Strategies for Enhanced Performance of Wastewater Treatment in Membrane Bioreactors," Proceedings of the ASCE/EWRI World Water & Environmental Resources Congress, Philadelphia, June 23-26.

Guo, L, Lahner, JK, White, DM, and Garland, DS. 2003. Heterogeneity of Natural Organic Matter in an Alaskan River," *Water Research*, 37:1, 015-1020.

Ye, B, Yang, D, and Kane, DL. 2003. "Changes in Lena River Streamflow Hydrology: Human Impacts vs. Natural Variations," *Water Resources Research*, 39:7, 1200, DOI 10.1029/2003WR001991.

Dyer, JA, Trivedi, P, Sparks, DL, and NC Scrivner. 2003. "Lead Sorption onto Ferrihydrite: II. New Insights in Modeling," *Environmental Science Technology* 37:9 15-922.

## News from AETDL

Clear your calendar for April 27-29, when AETDL (the Arctic Energy Technology Development Lab) will host their 2004 Rural Energy Conference in Talkeetna, Alaska. This conference is designed for folks in rural energy management, energy service and equipment providers, government agencies, national labs, technology development, housing authorities, universities, and other interested organizations. Events include 50+ research presentations, a poster session, and an energy-centered trade show. For more info, contact Juli Philibert at 907-474-1929, or e-mail [fyatdl@uaf.edu](mailto:fyatdl@uaf.edu).

## Notes from the INE Business Office

### SHANNON ON PURCHASING:

**INE Travelers:** Did you know that you can ask for a travel advance if your cash is a bit short? INE can help you, if you file your TA form at least a week prior to travel.

How do travel rules and regs concern students? Here's your chance to find out! I am designing a brief handbook and presentation for INE researchers and their students regarding the basics of research-related travel. Please identify the students you work with and contact me (474-7728) to arrange a meeting time in the near future.

### New INE Web Pages

What would you like to see on a page devoted to INE Grad Students? Send your ideas to [ffslb@uaf.edu](mailto:ffslb@uaf.edu).

For more info about the INE Research Flash, contact Sandra Boatwright at [ffslb@uaf.edu](mailto:ffslb@uaf.edu) Submission deadline for issue #7: 20 September 2003.