HUMBOLDT STATE UNIVERSITY

STUDENT CHAPTER
AMERICAN SOCIETY OF CIVIL ENGINEERS
ENVIRONMENTAL RESOURCES ENGINEERING

ERE MESSENGER

Volume 14, Number 1 Fall 2000

Derek Baker Joins ERE Faculty

by
Derek Baker
ERE Assistant Professor

My wife and I were happy to arrive in Arcata on August 13 after a long drive from Austin, Texas. I just received my Ph.D. in Engineering from The University of Texas at Austin with a concentration in Mechanical and Environmental Engineering. My dissertation involved reliability problems associated with the precipitation of calcium carbonate (e.g., scaling) from the potable water in solar hot water systems. I also worked on the development of an instructional thermodynamics website called *ThermoNet* intended for introductory thermodynamics students.

I received a B.S. in Mechanical Engineering from Virginia Tech in 1992 and an M.S. in Mechanical Engineering from The University of Texas at Austin in 1996. Previously I held several positions in the energy industry, including one in Norway, where I gained experience with solar energy, end-use energy efficiency, renewable energy policy, and coal and natural gas power plants.

As an undergraduate, I spent one summer bicycling across the United States with my best friend. The experience was significant for me because of the people that we met. It was the first time I realized the extent to which a person's experiences effect who they are, and how great the diversity of experiences is in this world.

My wife, Ozgur, is from Turkey and is finishing her Ph.D. in Counseling Psychology at The University of Texas at Austin. This fall she is teaching a course in Multicultural Counseling at HSU while she works on her dissertation, which is an investigation of the psychological impact of the earthquake in Turkey last summer. We plan to spend next summer in Turkey, where she will collect data for her dissertation and I will teach a course at The Middle Eastern Technical University in Ankara.

I am excited about teaching at HSU, primarily for the people and academic environment. Before applying for this position, I spoke with ERE graduate Dr. Richard Corsi, Associate Professor of Civil Engineering at The University of Texas at Austin. Dr. Corsi had wonderful things to say about HSU and the ERE program. I also enjoyed my experience while interviewing here last spring, especially the people that I met. This position is perfect for me because it encompasses my main areas of interest, which include energy and environmental issues and undergraduate teaching.

My teaching focus will be energy resources (e.g., thermodynamics and renewable energy systems) and general engineering courses. My research will focus on the development of web-based instructional media, and the transfer of energy and instructional technologies to developing countries. While teaching in Turkey next summer I plan to develop contacts and learn more about how the web can be used to enhance instruction in developing countries, with an emphasis on energy related topics. In the longer term, I plan to develop relationships with universities that use the web to benefit their students. I also want to work on transfering sustainable energy technologies to developing countries.

I am looking forward to meeting all of you this semester. ERESA

In This Issue

Helpful URLs

FE (E-I-T) APPLICATIONS
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http://www.aboutwork.com
http://www.careermag.com
http://www.careermosaic.com/
http://www.careerpath.com/
http://www.nap.edureadingroom/books/careers/
http://www.collegegrad.com/
http://www.occ.com
http://www2.nas.edu/cpc/
http://www.petersons.com/
http://www.studentcenter.com
http://www.waterweb.com/

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http://www.tc.cornell.edu/Edu/SPUR
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LIBRARIES/RESEARCH TOOLS
http://www.bibliomania.com
http://www.eb.com:180/
http://lcweb.loc.gov/homepage/lchp.html
http://www.w3.org/hypertext/DataSources/bySubject/Overview.html
http://www.lib.ox.ac.uk/internet/news/faq/by_category.index.html
http://www.webcom.com/~tbrown/findpage.html
http://www.iTools.com/research-it/
http://www.waterweb.com/

FIND UNIVERSITY HOMEPAGES
http://www.mit.edu:8001/people/cdemello/univ.html

RIVER FLOW AND STAGE INFO
http://www.acme.com/jef/flow/cdec.html
http://cdec.water.ca.gov/
http://www.nws.mbay.net/home.html
http://water.wr.usgs.gov/sites/sites.html

ERESA

A Fuel Cell for the Yurok Tribe

by
Christina Parra
ERE Graduate

In the summer of 1999, the Yurok Tribe of the Klamath River Valley in rural Northern California decided to provide telephone service to their residents in remote areas of the reservation using a radio-telephone network. The system would service the tribal health center and offices, with eventual expansion to two schools and two hundred residents. Here was our chance to help people meet their needs with minimum impact on the environment.

Here at the Schatz Energy Research Center (SERC) we thought the project would be a good opportunity for a remote fuel cell power system. National funding agencies, however, said it couldn't be done because we would need too much on-site storage of hydrogen. So we found private funding and created a base of support within the community. And now the Yurok Tribe of Northern California has access to telephone service.

The SERC/Yurok power system and the telecommunications repeater it supports are located atop Schoolhouse Peak (3100 ft, 950m) in Redwood National Park. Because the National Park Service has a ban on fossil fuel stationary power systems within the park, the system had to be clean. Photovoltaic power was an obvious solution, given the site's excellent solar resource during most of the year. And the backup power system for the PV's? A SERC fuel cell.

The system has performed beyond our expectations, racking up more hours of field operation than any fuel cell we've made or heard of—including those in our cars, which are also out in the field. As of spring of 2000, the fuel cell system has run for 2361 hours. It has been installed for 162 days and has started up 104 times. There have been no shutdowns due to system fault. Gross stack efficiency for the first winter of operation was 64% and net system efficiency was 49% (both at lower heating value).

The fuel cell system maintains the battery bank state of charge above 50% (averaging 74%), which will extend battery life significantly, and reduce the number of times the system batteries must be replaced and recycled. Eventually (when fuel cells are less expensive) this could entail a significant reduction in the life cycle cost of photovoltaic systems.

Each day we access data automatically from the lab using a cellular phone. The fuel cell voltage and current, ambient and stack temperatures, and hydrogen storage pressure tell us how well the system is running and allow us to schedule timely hydrogen deliveries. A relatively sunny Humboldt County winter has meant only three hydrogen deliveries since the beginning of November when we installed the system. Because the PV array should carry most of the load during the summer, we expect that four hydrogen deliveries will be sufficient this first year.

continued on page 11

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Indoor Air Pollution

ERE Grad to Teach Special Course Fall 2001

by
Rich Corsi (ERE 1983)
Associate Professor of Civil Egineering
The University of Texas at Austin

Air pollution. These words elicit images of automobiles, urban smog, and smokestack industries, right? Indeed, most of us interpret "air pollution" as synonymous with "outdoor air pollution." Yet, on average, Americans spend nearly 90% of their time indoors, where levels of most air pollutants are significantly higher than outdoors. In fact, the USEPA now ranks indoor air pollution amongst the greatest environmental risks to the public, with estimated cancer risks greater than 5,000 in a million nationally, solely from the air in homes, schools, and offices. These levels far exceed risks that trigger regulatory intervention for other environmental issues,such as toxic chemicals at hazardous waste sites or in drinking water supplies with risks on the order of 1 to 10 in a million. A sharp increase in childhood asthma is partly attributed to the degradation of indoor air quality, and recent studies suggest that poor indoor air quality in office buildings may cause a loss in national productivity that exceeds 240 billion dollars per year.

Modern indoor air quality problems are generally traced to the end of World War II. In the United States, there was a great demand for inexpensive housing, and the building industry responded in several ways. Suburbs sprang up across North America. Homes were built on smaller lots and garages were attached directly to the living space, inadvertently allowing for the entry of automobile exhaust and constituents of evaporative emissions into that space. Homes were also constructed of less expensive building materials comprised of adhesives and other components that off-gas a wide range of pollutants. There was an increasing demand for furnishings and consumer products that made life easier. Manufacturers responded by producing a wide array of carpet and other flooring material, easy-to-use cleaners, personal care products, air fresheners, pesticides and more. Many of these products emitted chemicals that are now known to be irritants, allergens, toxins, and carcinogens, and they degraded the quality of indoor air. Today, a new generation of consumer products is being brought into homes, schools and offices and continues to degrade the air within the environment where we spend most of our time. As an example, consider the rapid growth in sales of aromatic candles in the United States, a product that is rapidly becoming one of the greatest sources of human exposure to several toxins (lead, polycyclic aromatic hydrocarbons, and more)!

While many new sources of air pollution were added to the interior of buildings following World War II, most of these buildings remained relatively "leaky", either by the intention, e.g. opening windows, or by unintentional openings in the building envelope. In a sense, the intake of outdoor air was a classic example of dilution being the solution to indoor air pollution. However, this began to change in the late 1950s and throughout the 1960s as more buildings were constructed with air conditioning systems, meaning a lesser desire for natural ventilation. In 1973-74 the energy crisis led to major incentives for homeowners, commercial building owners, municipalities, and school districts to conserve energy. This was, and still is, often done by reducing fresh air intake into buildings, an unfortunate practice that contributes greatly to the degradation of indoor air quality.

Course Offering

During Spring semester 2001, I will offer an ENGR 480 Special Topics course on indoor air quality. The course will explore several topics, including the importance of indoor air quality on human health, types of indoor air pollutants and their effects, sources of indoor air pollution, methods for predicting the transport and fate of pollutants in indoor environments, methods for estimating pollutant concentrations and human exposure to pollutants, and possible control strategies. Several important pollutants will be considered in detail, including carbon monoxide, fine particulate matter, formaldehyde, radon, numerous volatile organic compounds, and mold. An emphasis will be placed on source characterization, with sources including press-wood products, carpet, space heaters, stoves, candles, cigarettes, electronic instruments (photocopy machines, computer monitors), cleaners, air fresheners, paint, and more. Students need not have a previous course on air pollution, but should have an eagerness to learn about an important topic that affects the lives of all humans, and that is emerging as an important environmental issue. ERESA

CALENDAR

Fall 2000 ERESA Activities

AUGUST
Derek Baker Brown Bag Welcome
ERESA Fall Tutoring Begins

SEPTEMBER
ASCE One-on-One Dinner

OCTOBER
ERESA/SWE Pizza Party

NOVEMBER
Fall Banquet & Follies
Election of ERESA Officers

DECEMBER
Happy Holidays!

Thank You Michael!

ERE Student Donates $10,000 to ERE

by
Katie Bowman and Monica Martin
ERE Undergraduates

Michael Winkler is dedicated to improving the environment, supporting sustainability and community service projects. He is an ERE student true to his values. Last year he donated $10,000 to HSU to initiate the Recycled Paper Campaign, now he has stunned the ERE faculty and students with a $10,000 donation to the Environmental Resources Engineering Department.

Michael, like many other engineering students, is dissatisfied with the lack of funds allotted by the university for equipment and equipment maintenance. In order for his donated money to be released, it must be matched by other donors. This is to encourage others to contribute. Those of us who know Michael know that he does not throw money around blindly; he makes decisions with his eyes wide open. "I feel that I have gotten a lot out of the program and hopefully some of the other graduates would like to contribute to the program to give other students some of the same opportunities. I know that the engineering budget for new equipment is very inadequate so I have donated $10,000 from stock. Last year I had a very good year in the stock market, so I would like to share some of the wealth with the school." It is intended that 70 percent of the total funds be allotted for new equipment, and the remaining 30 percent for equipment maintenance. "I am very bothered by the large portion of the state budget that is going into building prisons. At this point, more money is going to prisons than to higher education."

Some of Michael's other recent endeavors include the creation of a scholarship and a contribution to fund paid internships. "Even though I am an engineering student, my focus is on environmental sustainability and I think that covers a broad range of areas, and not just what we are doing in engineering." Michael's Scholarship for the Sustainable and Just Use of Natural Resources is open to all students who have performed outstanding service in supporting sustainability on campus or in the community. Michael will also be providing stipends to students who are working on an organic farm. "The current agricultural system in the U.S. has a heavy emphasis of the use of pesticides and other agricultural chemicals that indirectly use a tremendous amount of fossil fuels. I want to support farms that are chemical free (no pesticides or chemical fertilizers) and I also want to support local agriculture where we know how workers and the land are being treated." One of the farms that many students work for is the Arcata Educational Farm (founded by Susan Orneales & others) which is on land owned by the city of Arcata. "Many students cannot afford to work there for free so what I would like to do is create a fund that will pay for a stipend to make it more financially viable for students to work on these farms."

Michael received his bachelors degree in Physics from the University of Illinois (Urbana-Champaign) in 1971. He began his career as a computer programmer in Chicago, and in 1980 he moved to Mountain View, California where he worked for various communication businesses in the Silicon Valley. One of the most well known companies Michael worked for was Motorola, where he worked on the original development of cellular phones.

Michael's interest in environmental sustainability is not new. While living in Mountain View, he was very much involved in environmental sustainability. In the late 80's he set up a program where he worked as well as getting involved in a city recycling program. Soon, his volunteer environmental work became more meaningful so he decided to make a career change but still be technical while focusing on the environment. Michael decided to seek out an environmental engineering program. In 1997 he arrived in Arcata and received a part-time job at the Schatz Energy Lab, which made his decision to attend HSU easy.

Michael was in college in the middle of the Vietnam War and had a skeptical perspective of the government and on social justice. He also grew up during the civil rights era and even saw Martin Luther King Jr. speak in Chicago in the 1960's. In addition to liking gadgets and technology, Michael also has a strong interest in the implications of technology, both positive and negative. His strong interest in energy has led him to be active in helping HSU select its own supplier of electricity. About two years ago the CSU & UC systems signed contracts with ENRON. ENRON started off as a natural gas company but has been focusing on electricity in recent years. It also own three wind mill manufacturing companies, including one in California, and a large wind mill farm in Southern California. Energy costs through ENRON will likely be 10% more than present costs. This would likely increase student fees $3 per student each semester. Energy supplied will be mostly geothermal, biomass second, wind third , and hydroelectric would be the smallest amount, next to solar. Michael stated that "a lot of people are more familiar with Green Mountain but I decided that it would be difficult to change back to another supplier and the path of least resistance would be to go with ENRON. I am a residential customer of the ENRON renewable option, and I am a stock holder of ENRON so I have some bias." It may be interesting to note that the head of ENRON is the largest contributor to

George W. Bush, and the head of Green Mountain is the seventh largest contributor to George W. Bush.

Michael has a lot to say on the subject of renewable energy, especially when it comes to the depletion of current energy resources. "Even if we went to completely renewable energy, we can't use anywhere near the amount of energy we are using now. People say plug in the sun, but that won't do it. We need to shift to a transportation system where people don't travel as much or as far, and where there is much more use of public transportation, bicycles and walking in much more compact cities.

People scream about the price of gasoline increasing $0.50 a gallon but it is just going to get more severe and it will be permanent." The International Energy Agency, the main information agency for all the large industrial companies, says that the all-time peak for oil production will occur between 2010 and 2020.

Michael is also interest in running for a city council position following graduation, and being apart of the planning commission. Michael has experience working with Arcata's City Council. He has approached the council with his Light bulb bill proposal. "I get spurred by a lot of things just by walking around." Seeing that many regular incandescent lights are on 12 to 24 hours a day, Michael has proposed a matching fund to replace these porch lights with compact fluorescent bulbs for each residence in Arcata. These light bulbs use less energy than incandescent. Michael says, "The more glamorous thing is to put up solar panels, but this saves money."

When it comes to supporting issues pertaining to environmental sustainability, social justice, and community service, Michael doesn't just talk the talk, he walks the walk. He feels that he has benefited from the engineering program at HSU, as well as being a resident of Arcata. He sees a lot of potential both in the field of environmental engineering, and in the city itself. ERESA

Bringing Adaptive Management to Life

by
Lance W. Vail
Senior Research Engineer
Pacific Northwest National Laboratory
Richland, WA

Due to the complexities and interactions of the environment, significant uncertainties are inevitable whenever dealing with natural resources, and management plans can be improved by including an "adaptive" element. For example, forest management practices required to maintain the sustainable production of forest products while simultaneously providing habitat for fish and wildlife and protecting water quality and long-term soil productivity should be adaptive. The existing knowledge of many critical physical and biological processes is not adequate to ensure that any practices are optimized. As the understanding of the processes involved improves, chances for new innovative practices increase. Testing these practices through deliberate experimentation is required to improve their effectiveness.

Lance Vail is a 1979 ERE grad. He is also Director, Dharma Water Institute, and Adjunct Professor, Washington State University. He will present a lecture on Adaptive Management to the ERE Department on Wed, Sept 13, at 5:30PM in SD-5.

The goal of adaptive management is to continuously improve management practices through deliberate experimentation and careful monitoring. Adaptive Management practice involves an integrated suite of analytic tools, and requires a willingness on the part of regulators and stakeholders to accept some risk in order to possibly develop improved management practices. The regulated industries must also accept the risk of an adaptive regulatory environment. Adaptive management requires both caution and probing: caution to ensure that no irreversible impacts occur, and probing to encourage an improved understanding of the consequences of different practices.

Experiences with management of natural resources in the Pacific Northwest have been important for developing and advancing the concept of adaptive management. The concept of adaptive management has been endorsed by the various regulatory agencies and industries in the Pacific Northwest. Unfortunately, due to the lack of tools, effective adaptive management has remained unrealized. Adaptive management, without the appropriate tools, can become an open-ended nightmare for the regulated with all the risk being carried on their shoulders. Access to the appropriate tools is clearly in the interest of the regulated industries. It can improve their competitive advantage by accelerating acceptance of their innovative ideas on resource management.

The tools needed for making adaptive management operational involve such areas as: uncertainty analysis, physical and biological process models (e.g. linked climate-watershed-vegetation models, models of logging road impacts on hydrologic processes, wildlife habitat and fisheries models), integrated environmental monitoring, tradeoff analyses, linking process models with multiobjective optimization algorithms, risked-based decision making, data management (including integration of remotely-sensed data), stakeholder involvement, and regulatory analysis. ERESA

Felonies and Misdemeanors

by
Sheri Woo, P.E.
Science Writer and ERE Lecturer

The ERE program produces graduates who can tackle complex global problems. But, can these graduates effectively and concisely communicate their creative, innovative solutions to senior engineers and stubborn clients, to scientists in other fields, and to non-technical regulators and politicians?

Although ERE has always required technical writing in its curriculum, it has not explicitly taught writing skills except at the introductory level in ENGR 111, Introduction to Design. ERE has generally assumed, or at least hoped, that students would learn writing in GE courses or pick it up by "osmosis" in ERE courses. There is evidence, however, that this assumption (or hope) is not justified. In a 1998 survey of selected ERE graduates, respondents ranked technical communication skills as being very important to environmental engineers, but nearly half said these skills were not adequately developed while they were ERE students.

In January 2000, I was hired to help initiate and test a new technical writing component to the ERE curriculum. The intent is to improve students' writing skills in existing courses that already require some form of technical writing, such as lab reports or research papers. ERE Professor Brad Finney volunteered his ENGR 321 "Computational Methods II" course as the first to experiment with a new format, explicitly emphasizing writing and adding weekly lectures on the topic. Together, Dr. Finney and I hammered out some objectives for the technical writing aspects of the course:

- Convey the importance of clear and concise writing in environmental engineering.
- Improve students' writing fundamentals, such as correcting run on and fragment sentences.
- Introduce more advanced writing concepts required in engineering practice, such as changing a report's tone depending on the report's likely audience.

Functionally, I gave "mini-lectures" during the laboratory time, edited student reports for presentation quality, and answered students' questions about their edited reports. Students received a portion of their lab report grades for programming and technical aspects, and a portion for presentation quality.

We determined our degree of success by tracking the type and number of writing errors over the course of the semester. See Figure 1. A "misdemeanor" writing error is one that can be grammatically correct or incorrect, but in either case, the error makes the writer's meaning less clear. Misdemeanor writing errors include: long separation between subject and verb, the "it problem", mixed use of third and first person, and inappropriate number of significant figures. A "felony" writing error is one that brands the writer as uneducated, or possibly as someone who speaks English as a second language. Felony writing errors include: subject/verb disagreement, run-on and fragment sentences, possessive vs. plural confusion, and incorrect usage of effect vs. affect.

The most persistent "misdemeanor" writing error was the "it problem," where the word "it" does not refer to another subject or noun. While grammatically correct, this error exemplifies the writer's laziness. The two most persistent "felony" writing errors were subject/verb disagreement, and incorrect usage of effect/affect. Disagreement between the subject and verb was the most easily identified, and was corrected by decreasing the "distance" (that is, the number of words) in between the subject and verb. Confusion between effect (a noun) and affect (a verb) continued throughout the course.

Qualitative indicators of success included the increased number of Final Project Reports with grades of "B" or better, and positive feedback from students (which is rare, according to Brad Finney). In past semesters, only two or three Final Project Reports would receive "A" grades; in Spring 2000, six reports received "A"s, and five reports received "B"s, out of a total of 17 reports.

To some degree, all three objectives of the writing portion of the Computational Methods II course were met, and the program continues. However, writing is only half of the equation of clear communication; the other half is speech, which also needs to be squeezed into the curriculum. The ERE Department will continue emphasizing the importance of clear, concise communication in the practice of environmental resources engineering. ERESA

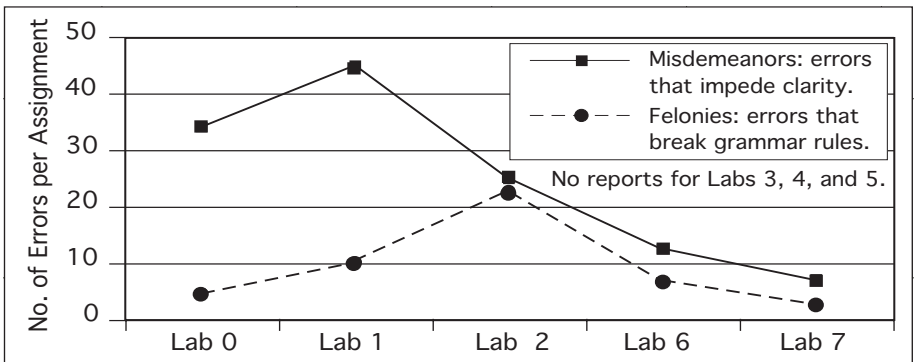

Figure 1. Frequency of Writing Errors (ENGR 321, Spring 2000)

SWE Receives $3400 Grant

by
Beth Eschenbaach
ERE Associate Professor

In the fall of 1998, the Society of Women Engineers (SWE) requested that the ENGR 333 Fluids Mechanics class design a flume exhibit for the Redwood Discovery Museum, the local children's science museum. Since then, SWE has been busy fund raising in order to complete the project. Three of the 15 designs submitted in 1998 best fulfilled the requirements. A composite design was developed and is being built this summer by ERE shop technician Cliff Sorensen.

This past spring, the Humboldt State University SWE Student Section successfully submitted a proposal to SWE National and the ExxonMobil Foundation for $3400 for the completion of the "Go with the Flow" flume project. These funds will allow the completion of the flume and help ERE students complete projects associated with the flume, as well as provide transportation costs for outreach visits with the flume. The "Go with the Flow" outreach program will introduce the concepts of open channel flow, fluid mechanics and appropriate engineering applications to elementary and middle school children through use of fun, hands-on activities designed by ERE students. ERE student volunteers will take the flume to schools and will also hold workshops at the university.

We hope you get involved. You will learn more about fluids, improve your communication skills and have fun! In your engineering courses you might be asked to design and build hands-on inserts or experiments for the flume. Or you may be asked to design display boards for each of the inserts and experiments. Or you may volunteer for an outreach opportunity. It can be a lot of fun to introduce children to some fundamental uses of environmental resources engineering in the hopes of sparking their interest in our career field.

We invite you to join in this fun, rewarding activity. Please contact SWE <swe@humboldt.edu> or Beth Eschenbach <eae1@humboldt.edu>.

SWE gratefully acknowledges the other supporters: ERESA, HSU Women's Enrichment Fund , ASCE, Spencer Engineering, WINS, many CalTRANS employees, Bill Popenuck, Stephen Davidson, Mary Wells and Kathyrn Corbett. ERESA

ERE Hosts ASCE "Water Treatment From Your Kitchen" Competition

by
Matt Kennedy
ERE Undergraduate

Water, water everywhere and not a drop to drink. That was the scene at the annual American Society of Civil Engineers (ASCE) "Water Treatment From Your Kitchen" Environmental Engineering Competition held on Earth Day, April 22, 2000 at HSU. The competition, in its third year, is an inter-collegiate challenge that requires engineering students to design and construct, from common household kitchen items, water treatment systems that will contain, treat, and discharge a sample of water contaminated with organic and inorganic matter. It was started by the ASCE Student Chapter at U.C. Davis in 1998 to satisfy the competitive design needs of environmental engineering students.

This year boasted the largest turnout yet for the competition, with schools from California, Oregon and Nevada taking part. In attendance were UCLA, Cal Poly San Luis Obispo, UC Davis, University of the Pacific, University of Nevada, Reno, two teams from Oregon State University, and HSU. At the first Competition in 1998 UNR won at Davis. In 1999 HSU won at Reno.

The event began near Science B at 9 a.m. Designs were tested for minimum time to produce 2 liters of treated water, maximum volume of treated water in 1 hour, highest quality of effluent, and best technical design.

Following the competition teams presented the specifics of their designs. U.C. Davis finished first, recapturing the honor of hosting the competition they started. UNR and UCLA took second and third, respectively. The first place prize was a hand carved trophy made by the very talented ERE student, Brad King. His creation is a 6-inch high toilet carved out of white ash with a miniature tree stump made of redwood connected to its base. Also attached to the trophy was a plate with the names of the schools that had won first place. It is intended to be passed on from year to year to each winning school. It is truly a work of art.

What made the 2000 competition so exciting was the number of schools competing and people in attendance, including a cameo appearance by HSU President, Alistair McCrone. Local news channels 3 and 6 also popped in to get coverage of the Competition and the HSU Arts and Music Festival, which was held the same day. In addition to all the fun, the Competition provided the ERE department with some great publicity. Coupled with the ERESA/SWE food booth and the Engineering 111 solar oven design competition, the Water Treatment Competition helped bring ERE students together for a day of club activities and fun. ERESA

Building BIG

ASCE and PBS to Educate the Public About Civil Engineering

by
Heidi Gehlhaar
ERE Undergraduate

Civil engineers provide us with the infrastructure necessary to go about our everyday lives. They design roads and highways to provide us with safe corridors of travel, bridges to connect us across canyons and waterways, buildings to provide shelter and house commerce and industry, and domes to house our sports competitions. But how much does the general public know about the problems engineers face and the methods they use to solve them? This fall, a national project called Building Big aims at educating the public about civil engineering.

Building Big is sponsored by WGBH in Boston, the largest PBS station in the country and producer of most of the PBS programs shown nationally. KEET is part of a model community with partners including the North Coast Branch of ASCE, the Humboldt County Office of Education, and the Boys and Girls Club Eureka Teen Center. The North Coast model community has raised $12,000 in funds provided by local donors such as engineering and construction contractors and ASCE. This money will go toward funding an hour-long program on local engineering wonders such as the Arcata Marsh, The Crescent City Breakwater, and Fernbridge. It will also fund outreach aimed at exposing local children to the world of civil engineering.

In late July, three members of the local Building Big committee, including me, traveled to WGBH in Boston. We spent three days meeting representatives of other PBS stations from around the country who have also received Building Big grants. Many ideas for the project were traded and WGBH's educational resources were explored. A portion of the time was also spent learning how to work with kids to effectively teach them basic engineering principles. This meant many difficult hours of creating towers of newspaper and building bridge columns from toilet paper rolls. The North Coast team came back with a great deal of enthusiasm and many new ideas for our local project.

During September and October, professionals and students from our local engineering community will visit 7th and 8th grade classrooms in Humboldt and Del Norte Counties. The classes will get an opportunity to do hands-on activities that introduce them to concepts such as tension, compression, and load. The children will also learn about concrete, its various forms and uses. Each class will then get to come up with their own "mix design" for a concrete test cylinder. The class will mix the concrete according to its own design, pour it into the cylinder form, and let it cure.

All of the cylinders created will be tested in a materials loader on November 11th at the Build-A-Thon, a one-day event held at the Bayshore Mall to highlight the profession of civil engineering. Hands-on activities, videos, equipment displays, and an engineering game show will be included. Crushing of the concrete cylinders will also be taking place all day. The class whose cylinder supports the largest load will win prizes and funding for educational supplies.

The Building Big project culminates on November 14th with the debut of the local television program on engineering wonders. The hour-long special will air at 8 pm on KEET-TV channel 13. The program will explore the engineering and history behind Fernbridge, the Humboldt Bay dredging project, the Arcata Marsh and Wildlife Sanctuary, Ruth Dam, and the Crescent City Breakwater. The challenges and triumphs of each engineering wonder will be explored, along with their importance to the North Coast community today. A viewing party will be held at the Eureka Teen Center to reward all donors and volunteers who have dedicated so much for this truly impressive project. The project will continue into 2001 with an essay contest on local engineering wonders for 7th and 8th grade students and a rebroadcast of the national miniseries and local program during National Engineers' Week in February.

A training session for interested volunteers will be held at HSU on September 20th at 5:30 pm (location TBA). This session will introduce volunteers to the activities they will be doing with the kids and will allow the project organizers to set up times for classroom visits. This is a great opportunity to learn about a subject not covered much by our department . . . concrete! Learn about the various types and uses of concrete and how its strength varies as the ingredients or moisture content change. Then share your knowledge with younger members of our community! This is also a great way to make connections with professional engineers in the area.

If you are interested in participating in classroom visits or helping in any other way, please e-mail Heidi Gehlhaar at hmg4@humboldt.edu. Also look for more info on the Building Big project in ERE e-mails and in the Fish Bowl! ERESA

2000 Awards and Recognitions

by
Katie Bowman & Monica Martin
ERE Undergraduates

Throughout the 1999-2000 school year many Environ mental Resources Engineering students received recognition and awards for their activities. This article discusses awards that were given to students by the ERE faculty, and the Environmental Resources Engineering Student Association (ERESA).

The ERE Faculty recognized four students: Tully McCarthy, Ben Bray, Jennifer Johnston, and Lonnie Grafman. ERE Senior Tully McCarthy received Outstanding Engineering Graduate of the year. Tully demonstrated excellent academic achievement and professional potential in Environmental Resources Engineering. Ben Bray, also a Senior, received the Homer Arnold Scholarship Award, which is awarded to ERE students who demonstrate outstanding achievement in the application of Environmental Resources Engineering. Jennifer and Lonnie received the Roscoe-Schenler Scholarship, which is given to ERE students who demonstrate outstanding potential in Environmental Resources Engineering. The last two awards are given each year in honor of former HSU Engineering professors Homer Arnold, Jim Roscoe and Bill Schenler.

The Environmental Resources Engineering Student Association (ERESA) granted a service award to a student who volunteered a great deal of time to student activities. Sean Bush received the ERESA Outstanding Service Award for his assistance with the annual rafting trip, and his help with other club activities.

Congratulations to award recipients, and special thanks to the many other students who gave their time and energy to ERE activities and events! ERESA

ENGINEER IN HELL

An engineer dies and reports to the pearly gates. St. Peter checks his dossier and says, "Ah, you're an engineer — you're in the wrong place."
So the engineer reports to the gates of hell and is let in. Pretty soon, the engineer gets dissatisfied with the level of comfort in hell, and starts designing and building improvements. After a while, they've got air conditioning and flush toilets and escalators, and the engineer is a pretty popular guy.
One day God calls Satan up on the telephone and says with a sneer, "So, how's it going down there in hell?" Satan replies, "Hey, things are going great. We've got air conditioning and flush toilets and escalators, and there's no telling what this engineer is going to come up with next."
God replies, "What??? You've got an engineer? That's a mistake — he should never have gotten down there; send him up here." Satan says, "No way. I like having an engineer on the staff, and I'm keeping him." God says, "Send him back up here or I'll sue."
Satan laughs uproariously and answers, "Yeah, right. And just where are YOU going to get a lawyer?"

Top 10 reasons computers must be male.

10. They have a lot of data but are still clueless.
9. A better model is always just around the corner.
8. They look nice and shiny until you bring them home.
7. You'd better always have a backup.
6. They'll do whatever you say if you push the right buttons.
5. The best part of having one is the games you can play.
4. In order to get their attention, you have to turn them on.
3. The lights are on but nobody's home.
2. Big power surges knock them out for the night.
1. Size does matter.

Top 10 reasons compilers must be female:

10. Picky, picky, picky.
9. They hear what you say, but not what you mean.
8. Beauty is only shell deep.
7. When you ask what's wrong, they say "nothing".
6. Can produce incorrect results with alarming speed.
5. Always turn simple statements into big productions.
4. Smalltalk is important.
3. You do the same thing for years, and suddenly it's wrong.
2. They make you take the garbage out.
1. Miss a period and they go wild.

CONGRESSIONAL TRASH

If you think you have it bad where you work, can you imagine working at the following company?...This organization has more than 500 employees with the following statistics:

- 29 have been accused of spousal abuse
- 7 have been arrested for fraud
- 19 have been accused of writing bad checks
- 117 have bankrupted at least two businesses
- 3 have been arrested for assault
- 71 cannot get a credit card due to bad credit
- 14 have been arrested on drug-related charges
- 8 have been arrested for shoplifting
- 21 are current defendants in lawsuits
- In 1998 alone, 84 were stopped for drunk driving

Can you guess which organization this is? Give up?
It's the 535 members of our United States Congress. The same group that cranks out new laws to keep the rest of us in line.

Scholarship Hints

by
Matt Kennedy
ERE Undergraduate

It's about that time of year to try earning a few extra ducats through scholarships. It's a chance to help ease the burden of tuition with a little extra FREE money (well, nothing in life is totally free). Imagine having an extra $2,000, $3,000, or even $4,000 to help pay for the next school year, all earned in less than 25 hours of work. That's more than $200 an hour! And, the effort is nothing that would cause you to break a sweat.

I've been applying for scholarships for nearly five years, almost my entire college career, and I have learned how to be successful at it. For the past three years I have managed to cover all of my tuition fees with scholarship monies, and I usually I have some cash left over to cover books. When I first started applying for scholarships, while attending junior college, I didn't do too well as my resume and persuasive writing skills were not what they are today. But I have learned to finely tune them through the aid of my professors, career counselors, fellow students, and most of all, my failed applications.

The application packet for a standard scholarship usually requires the following items:

- A completed application form
- An official transcript from present or last school attended
- A statement of educational goals and career objectives
- A current resume

Three letters of recommendation
Information regarding financial income

Normally the most time-consuming portion of this process is writing a good statement of career goals. This statement, will vary from scholarship to scholarship and must be tailored to each particular fund. They usually range from 500 to 1000 words, and many can be adjusted for use with other scholarships. I would recommend asking a professor or career counselor to help proof read the essay before it is submitted. Your professors are very willing to help and eager to see you succeed, so get to know them.

Official transcripts and postage are the only item in the application process that will cost you any money. Official transcripts at HSU currently cost $4 for one, $2 each for up to 10, and $1 each for more than ten.

Although scholarship applications do not always require a resume, I recommend having one. Make an appointment with Barbara Peters in the career center to have her review your resume and make recommendations.

The letters of recommendation usually must come from educators, although some scholarships may also require a personal recommendation, such as from a club or academic advisor, an employer, or other specified individual.

Most scholarships have eligibility requirements and selection criteria. The most common eligibility requirements are that the student is full-time in a 4-year undergraduate college with a B.A./B.S. objective, is a U.S. citizen, has a GPA of at least 3.0, and demonstrates interest in a specified area. Selection criteria usually includes financial need, leadership ability, academic records, and career goals. In general, no one area dominates another, so one criterion may compensate for another you may be lacking in. If you are lacking in one area, get some experience in it. You may be surprised at what you learn.

I have included a list of scholarship contacts. A few may require association memberships, which is often useful in itself. Some I have been quite successful with, others not so, but keep trying each year. I recommend sending a short letter and self-addressed stamped envelope to each requesting an application. When the applications begin arriving the real fun begins. Good luck!

Scholarships and Contact Info

Association of California Water Agencies Scholarships
910 K Street, Suite 100
Sacramento, CA 95814-3512
www.acwanet.com

Emily M. Hewitt Memorial Scholarship
Calaveras Big Trees Association
PO Box 1196
Arnold, CA 95223

Samuel Fletcher Tapman Scholarships
American Society of Civil Engineers
1801 Alexander Bell Drive
Reston, VA 20191-4400
Attn: Student Services
www.asce.org/peta/ed/appp.tap.html

B. Charles Tiney Memorial Student Chapter Scholarships
American Society of Civil Engineers
1801 Alexander Bell Drive
Reston, VA 20191-4400
Attn: Student Services
www.asce.org/peta/ed/appp.tin.html

Thomas Pratte Memorial Scholarship
Surfrider Foundation
122 S. El Camino Real PMB#67
San Clemente, CA 92672
www.surfrider.org

Consulting Engineers and Land Surveyors of California scholarship program
1303 J Street, Suite 450
Sacramento, CA 95814
www.celsoc.org

Dam Safety Scholarship
Association of State Dam Safety Official, Inc.
450 Old East Vine, 2nd Fl.
Lexington, Kentucky 40507
http://members.aol.com/damsafety/homepage.htm

Ligno Tech, USA

Richard A. Herbert Memorial Scholarship
100 Hwy. 51 South
Rothschild, WI 54474

ASHRAE Undergraduate Scholarship
American Society of Heating, Refrigerating and Air-conditioning Engineers, Inc.
1791 Tullie Circle, N.E.
Atlanta, GA30329

California-Nevada Section American Water Works Association
10574 Acacia Street, Suite D6
Rancho Cucamonga, CA 91730
Attn: Scholarship Program

Barry M. Goldwater Scholarship and Excellence In Education Foundation
Goldwater Scholarship Foundation
6225 Brandon Ave. Suite 315
Springfield, VA 22150
www.act.org/goldwater

ERESA

Manila BMX Track Community Service Project

by
Marc Leisenring
ERE Undergraduate

During the 1999 Spring se mester, Salena from the Manila Community Center contacted the ERESA faculty advisor, Dr. Margaret Lang, seeking assistance in the design of a BMX track. Mararet passed the information on to the engineering club and a motivated handful of ERESA members set up weekly meetings to brainstorm ideas and begin putting things in motion.

In the fall of 1999, ERESA organized a surveying workshop led by Jon Forsyth, PE, ERE graduate and Survey Manager for Winzler and Kelly. It was held at the proposed track location at Manila Community Park. The purpose of this workshop was to expose ERE students to the art of surveying and develop a topographic description of the track area. The data collected during the workshop were used to develop a CAD drawing of the BMX track. Using AutoCAD, ERE student Brad King constructed a 3-D drawing based on a sketch provided by Salena. The drawing was submitted to the Eureka Planning Department and the track proposal is now being submitted to state and federal agencies for approval. The source of the clay material needed for the track is still uncertain. However, thanks to the efforts of ERE student and U.S. Coast Guard member Domingo Cardoza, Coast Guard trucks are being arranged to transport the soil once found.

The track is projected to be finished this year, depending on the speed of the planning department review process and the weather. As soon as the proposal is approved and soil is found and trucked to the construction site, volunteers will be needed to build and landscape the track. For more information , contact Beverly or Salena at the Manila Community Center (445-3309). ERESA

Fuel Cell

• *continued from page 2*

The 24-volt PV system consists of twelve Siemens 12-volt, 65-watt photovoltaic modules, ten Solar Electric Specialties 12-volt, 225 amp-hour deep cycle batteries, and a Solar Electric Specialties PV Series charge controller/monitor. The PV modules are mounted flush on the south-facing wall of an existing fire lookout tower.

The fuel cell is a 32-cell, 140 cm2 PEM stack, designed and fabricated in-house by SERC engineers. The membrane-electrode assemblies are Gore 5510s with E-Tek ELAT gas diffusion media. A solid-state fuel cell controller switches the stack on when the battery voltage falls below 24.7 V and switches it off when the voltage rises above 25.2 V. Oxygen is provided to the fuel cell with a small centrifugal air blower. Natural convection cools the stack.

The hydrogen supply for the system consists of twelve industrial gas cylinders manifolded together. Cylinder pressure is initially 2000 psig, resulting in 60,000 standard liters of total storage. Two regulators reduce the line pressure to about 3 psig for delivery to the fuel cell. A commercial supplier delivers replacement cylinders. In the future we hope to install a PEM electrolyzer to produce the hydrogen renewably.

The load is a telecommunications repeater transceiver. Continuous power demand is approximately 100 watts DC. Parasitic loads include the fuel cell blower and the hydrogen purge and supply solenoids, totaling an additional 24 watts.

The $130,000 total cost was much higher than the optimistic estimates offered by many in the fuel cell industry. This number, however, includes specialized design, fabrication, and assembly. We applied some new ideas in the field, learning important information about system simplification and durability. We will track fuel cell behavior under a variety of environmental conditions over a long period of time. At the same time, we are providing a useful (in fact, critical) service in a quiet, nonpolluting way. So, for us, the price is a bargain.

Much must happen between now and fuel cell commercialization. Large investments, and probably government incentives, will be required to produce technological leaps that increase power density and simplify the systems.

In the lab we'll need careful research and development, without the promise of immediate gratification. These could take years, but we're holding tightly to our dream of a highly efficient, 100% renewable energy economy. The success exhibited in this project is cause for excitement. With each setting of the sun on pristine Schoolhouse Peak, a fuel cell silently engages in service to the Yurok Indians.

Reference:
Lehman, P.A., C.E. Chamberlin, R.A. Engel, and J.I. Zoellick (2000). A Photovoltaic/Fuel Cell Power System for a Remote Telecommunications Station.
Schatz Energy Research Center
Humboldt State University
Arcata, CA 95521
Phone: (707) 826-4345
SERC Web site:
http://www.humboldt.edu/~serc/index.shtml
Web sites for photos:
http://sorrel.humboldt.edu/~serc/schoolhousepeak.html
http://sorrel.humboldt.edu/~serc/seasons.html ERESA

Thanks for Making It Possible...

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