HUMBOLDT STATE UNIVERSITY

ASCE

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ENVIRONMENTAL RESOURCES ENGINEERING

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THE INSANE STORY OF MTBE AND LAKE TAHOE

by
Dawn Forsythe, Public Affairs Officer
South Tahoe Public Utility District

The gasoline additive, MTBE, is leaking from underground gasoline tank systems and destroying drinking water sources, and the U.S. EPA and California environmental regulators close their eyes.

The insane story of MTBE, methyl tertiary butyl ether, is just beginning. Sadly, one of the places the story is unfolding is Lake Tahoe, the "jewel of the Sierra." Within just one year, the South Tahoe Public Utility District lost more than one-third of its drinking water wells because of groundwater contamination by MTBE, and the contaminant is found at depths of 100 feet in Lake Tahoe itself.

A recent study by the Lawrence Livermore National Laboratory concluded that MTBE is a "frequent and widespread contaminant," estimating that it has contaminated groundwater at over 10,000 monitoring sites in the state. And it is here for a very long time: initial indications are that MTBE has a half-life of 26 years, taking more than a century to biodegrade, and there is currently no proven treatment technology to remove MTBE from drinking water.

MTBE has not been subjected to even the most basic health effects testing. An April 1998 EPA research strategy document states that "a key question is whether oxygenates [like MTBE] in water pose a significant threat to human health... The extent of population exposures to MTBE in drinking water is unknown. Even in cases where MTBE is clearly present in public or private water supplies, only limited guidance exists as to the levels that would be acceptable or unacceptable from the standpoint of public health... Virtually no information exists on the effects of ingested oxygenates on humans."

With all of this information, or lack thereof, one might expect that environmental agencies would be scrambling to prevent further contamination. Not so. You see, it was the environmental agencies that encouraged the widespread use of MTBE in the first place. Beginning in 1992, the federal Clean Air Act required the use of oxygenated gasoline in certain areas with poor air. MTBE was the oxygenate of choice for oil companies, especially since one of the ingredients is a waste byproduct of the refinery process. It has been estimated that MTBE provides $2 billion in profits to the oil companies. Another oxygenate, ethanol, does not have the environmental problems of MTBE and could be used to help reduce automobile emissions, but California regulations effectively bar the use of ethanol in the state.

So, the situation can be summed up: Indispensable water resources are being destroyed by a waste product that is generating profits for oil companies, and we don't have any idea

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In This Issue

Alumni Profiles

Michael Plastino
BS ERE 1996
Graduate Student
Environmental Resources Engineering, SUNY, Syracuse, NY

After my graduation celebration roadtrip across the U.S., I couldn't find an environmental engineering position I wanted in the Sacramento or San Francisco areas, so I settled for a job writing hydrology and geology sections of environmental impact reports for a small firm in Sacramento. I was dissatisfied with the work, feeling like the reports were rubber stamps for developers'plans. My dissatisfaction, combined with the lack of training, led to my being fired within a few months.

I had been researching graduate programs which emphasized geographic information systems (GIS), and I was interested in two types of programs: planning, and environmental engineering. I decided to broaden my training and chose planning within a landscape architecture program at the State University of New York (SUNY) in Syracuse. However, the program was heavily slanted toward site design and manual drawing, both of which repelled me greatly. I dropped the program mid-semester and jumped into the GIS program within Environmental Resources Engineering, a program very similar to the HSU ERE program.

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The leap into the new program has been quite rewarding. I interned with the EPA Office of Water in Washington D.C. this last summer, assisting with the Index of Watershed Indicators (IWI), a web-based assessment of the water quality of all watersheds in the U.S. (http://www.epa.gov/surf.iwi/). The experience was amazing. I am currently working on finishing my IWI-related master's thesis by May in order to start working on a permanent basis with the EPA Office of Water in Washington, D.C.

Kemset Moore
BS ERE 1996
Transp Engr, Civil; Design Unit
CalTrans, Eureka, CA

I started my engineering degree as a re-entry student at Cabrillo College in Aptos, when my son was eighteen months old. Twelve years, another baby, and a move back to Humboldt County would pass before I finished.

Since I wasn't a 'traditional' student, I probably wasn't going to be a 'traditional' engineer either. (I even had one misguided person tell me if I didn't get an engineering position by the time I was 40, no one would hire me). So, to gain experience, I joined AmeriCorps, Watershed Stewards Project. I was placed at Six Rivers National Forest, with Mike Furniss, the Forest Hydrologist, as my mentor. For two years as an AmeriCorps Member, and then an additional year as a hydrologist with the Forest Service, I worked on projects relating to fish passage, culvert design, hydrology, and watershed analysis.

This past September, a few weeks before my 48th birthday, I accepted a permanent position with CalTrans in Project Design. Under the supervision of a lead engineer, I have been assigned a complex roadway and culvert rehabilitation project. I plan and carry out field work, co-ordinate with traffic, right of way, environmental, materials, and hydraulic engineers, use CADD and digital terrain modeling software, keep within a budget and meet deadlines. My task is to create a set of plans and estimates to be used in contract bidding and construction. The work is mentally challenging, diverse, and will product tangible results.

Steven A. Allen
BS ERE 1996
Project Manager
Spencer Engineering & Constr Mgt
McKinleyville, CA

I was attracted to the ERE program because of the versatility it provides its graduates in the working world. My initial interests were water resources and energy issues, but I finished my classes with an emphasis in Geotechnical Engineering.

I saw a job announcement posted for an engineering technician at a local Civil Engineering firm. Having no prior engineering work experience, I was hoping to gain some interview experience. I applied and ended up working for Spencer Engineering & Construction Management, Inc. as a project engineer. My "foot-in-the-door" job opportunity gave me varied professional experiences as an engineer. I have worked on water, sewer, and road designs, water system and openchannel flow modeling, bank stabilization and flood repairs, project permitting, project managing, and construction inspecting, to name a few.

I am active in the local ASCE branch, and this is my second year as the ASCE Representative to the ERESA/ASCE Student Chapter at HSU. I enjoy interacting with ERE students and encouraging their participation in professional activities.

It's true. There is life after the Environmental Resources Engineering program! I thoroughly enjoyed my education at HSU and am sure it will benefit me for the rest of my life. I am considering pursuing a graduate degree in Engineering in the next couple of years. But taking the P.E. exam next April is my first priority. Fortunately, I now feel my options are wide open. **ERESA**

DECOMMISSIONING THE HUMBOLDT BAY NUCLEAR POWER PLANT

by
Katie Bowman and Joanne Chan
ERE Junior Students

EDITOR'S NOTE: This article is based on an interview with Alec J. Arego, Public Affairs Representative, PG&E.

The Humboldt Bay nuclear power plant began operating in 1963 and was permanently shut down in 1976. In 1985 it was placed in "SAFESTOR," one of three decommissioning options authorized by the Nuclear Regulatory Commission (NRC) that lets the plant remain idle for a period of 30 years before the site is cleaned up and dismantled. PG&E has proposed to begin moving used nuclear fuel, which is currently stored in a spent fuel pool at the plant, to steel containers, called dry cask storage. This storage option would be temporary until the used fuel can be moved to a permanent spent fuel repository. The remainder of the plant will be dismantled and the site cleaned up after the used fuel is safely removed.

The spent fuel can remain at this location only until 2015. Using the mechanism of dry cask storage, PG&E is working toward early dismantlement. There is currently no place to put the 390 spent fuel assemblies, which results in a physical and legal conflict. During the 1960's and 1970's the plan was to have a geographical location to put the spent fuel in by 1998. Yucca Mountain in southwestern Nevada is the chosen storage facility location due to its geological stability, but it will not be open for use for some time. In the mean time PG&E would like to place the fuel in dry cask storage that can be licensed for both transport and storage. Such a cask will not be difficult to build, but it will be difficult to obtain a license for a cask that fuel can be both transported and stored in. Because more and more nuclear power plants are being decommissioned, the cask manufacturing market has increased, and licensing for newer designs should be obtained more easily. A dry cask design must also follow certain seismic criteria. In the case of an earthquake, the cask must withstand a force of 2 G's. Cask designs are also site specific; licensing depends upon where the cask is placed on the site. In the best case scenario PG&E expects to be finished with the licensing process by 2003.

While waiting to implement dry cask storage of the spent fuel, the current decommission of the power plant revolves around taking down the power plant's 250-ft tall stack. During plant operation the stack's purpose was to vent air and radioactive gases. The stack also filtered radiation from the air and gases released from the plant. The inside of the stack is where radioactive contamination is heaviest. The process of taking down the stack includes coating the inside of the stack with glycerin, cutting the stack into sections that will be encased within a dense water-tight material and lifted off with a crane. These sections will then be shipped to Hanford, Washington for radioactive removal.

The total expected decommissioning costs are estimated at $290 million. The costs for dry cask storage are estimated at $16 million. Complete decommissioning activities include permanent removal of major radioactive components, such as the reactor vessel, steam generators, or other components that are comparably radioactive. Contaminated materials may either be cleaned of contamination on the site or shipped to a waste-storage facility. Unfortunately, a waste-storage facility is not currently available. ERESA

CALENDAR

JANUARY
Welcome Pizza Party
ERESA Spring Tutoring Begins

FEBRUARY
ASCE Design Competition
MathCOUNTS

MARCH
Comedy Night
ASCE Mock Interviews

APRIL
ERESA Annual Rafting Trip
ASCE/ERESA Awards Banquet

MAY
Happy Summer Vacation!

Ten Tips to "Write Good"

1. Never abbrev.
2. Pronouns must agree with its antecedents.
3. Verbs has to agree with its subject.
4. Prepositions are not to end sentences with.
5. Don't use no double negatives.
6. Use commas, only, when needed.
7. Use commas to separate words in a series parentheticals introductory clauses and the like.
8. Read over your work to be sure you have not any words out.
9. Keep your work neat and tidy.
10. While a transcendent vocabulary is laudable, one must nonetheless keep incessant surveillance against such loquacious, effusive, voluble verbosity that the calculated objective of communication becomes ensconsed in obscurity.

Today Decides Tomorrow

by
Brian Exberger
ERE Senior Student

What we all have done and learned in the past is what builds today. And what we do today builds tomorrow. My name is Brian Exberger and I am currently completing my BS in Environmental Resources Engineering. Years ago my high school art club and an artist named John Pugh created a three-panel mural that reads "Today Decides Tomorrow." This group of knowledgeable, concerned high school kids examined their instant in time, plus and minus fifty years.

The first panel represents the fifty years leading up to "today." It shows the progression of tools and technology through the present day, as well as the waste created by used and outdated materials. The second panel represents the decision to improve our surroundings which have been degraded over the last fifty years. Possible improvements include using renewable energy resources that will result in less toxic byproducts, and recycling our used materials to relieve landfill sites. The third panel envisions the future made possible through the use of appropriate technology.

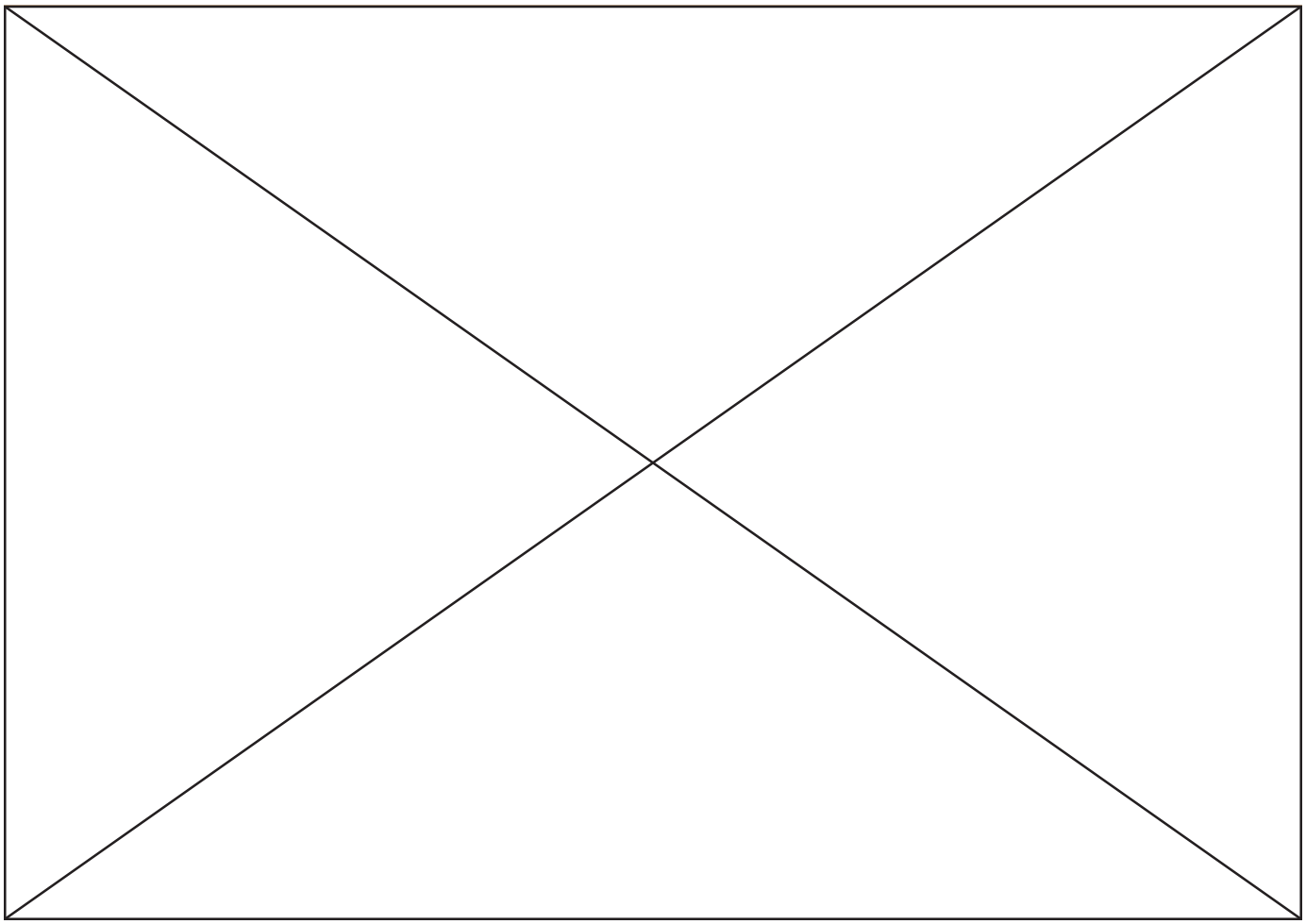
The mural depicts a balance between the advancement of technology and the overall well-being of the planet. It is a symbol of time moving forward, and technology and common sense mixing for a better tomorrow. **ERESA**

Bullshit

A turkey was standing in a field chatting to a bull. "I would love to be able to get to the top of yonder tree," sighed the turkey, "but I haven't got the energy." "Well, why don't you nibble on some of my droppings?" replied the bull. "They're packed with nutrients." So, the turkey began to peck at a lump of dung and found that it actually gave him enough strength to reach the first branch of the tree. The next day, after eating some more dung, he reached the second branch. Finally, on the third day, he was proudly perched at the top of the tree. Whereupon a farmer spotted him, dashed into his farmhouse, emerged with a shotgun, and shot the turkey right out of the tree.

Moral of the Story:

Bullshit might get you to the top, but it won't keep you there.



Mac McKee Q & A

EDITER'S NOTE: Mac MaKee was an HSU ERE faculty member from 1984 to 1998, and retired in December 1998 to accept a position at Utah State University. During his final HSU semester he agreed to answer student questions; here are your questions and Mac's answers.

1. In general, what are your feelings about Humboldt's engineering program?

My basic feelings are: I'm glad I was a part of the ERE program, and now I'm happy to be leaving. Basically, I think you should try to shake things up in your life every four or five years just so you know you're still alive. It's time for me to move on. I've enjoyed teaching at HSU because it allowed me to continue to learn about engineering, especially during the first few years of my time here. (I think I did my best teaching in my first year at HSU. It's all been downhill since then—you're lucky to be getting rid of me.) I've enjoyed learning how to motivate students. The adrenaline rush a student gets when forced to perform under conditions that provoke abject, stark terror seems to work nicely as a motivating factor; masochistic students also seem to respond quite well to my teaching methods. I suppose the best part of the experience has been in watching students finally graduate from the program and leave HSU. Oh, yeah, and then when they become successful engineers, that's pretty good, too.

2. If you could, what would you change to improve the ERE department at HSU for students?

In some areas, the ERE program is excellent, but I think it could use some improvement in others. Our graduates are well prepared for graduate school, but those who go to work in the private sector could benefit from more background in some bread-and-butter topics which are never mentioned in the courses we offer. I am concerned that we have stagnated to a certain degree in the last decade, and are no longer leading the pack of environmental engineering programs at the undergraduate level. Many of our graduates have told me that when they have gone on job interviews, many prospective employers don't see our program as a "real" engineering program. They are mistaken, of course, but I worry that we are not doing anything about this image problem.

My recommendations are to:

• Conduct a comprehensive curriculum review and, as necessary, modify the curriculum to address present and anticipated future demands for engineers. Include an analysis of:

What our graduates are doing?

Where they are getting jobs?

Are these jobs in the ERE? If not, why not, and what implications does this have for the curriculum?

• Find out why our enrollments are declining, and then DO SOMETHING to turn this around.

• Reverse the trend in the department toward exclusion of ideas, methods, and even individuals that are not environmentally P.C. Folks, engineering is a discipline and an occupation, not a religion. Any attitude that somehow "environmental" and "civil" are different or at odds is ter-

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ERE GRADE CHANGE FORM

To: ERE Professor _____
From: ERE student _____

I think my grade in your course, ENGR _____, should be changed from _____ to _____ for the following reason(s):

___1. The person whose exam I copied made a higher grade than I did.
___2. I need an "A" in this course to balance my "F" in ENGR _____.
___3. I'll lose my student aid.
___4. I didn't come to class and the person whose notes I studied took really bad notes.
___5. I studied basic principles but your exams wanted every little detail.
___6. I learned all the facts and definitions but your exams asked about general principles.
___7. I didn't take notes because Beethoven___ Mozart___ was too loud and I couldn't hear your lectures.
___8. You told us to be creative but you didn't tell us exactly how you wanted that done.
___9. I was creative and you said I was just shooting the bull.
___10. You locked the classroom door at 7:30 AM and I couldn't get in.
___11. You are prejudiced against: Males___ Females___ Catholics___ Protestants ___ Jews___ Moslems___ Whites___ Blacks___ Chicanos___ Minorities___ People___ Students___
___12. The lectures were:
•too detailed to pick out important points___
•not explained in sufficient detail___
•way too boring___
•all jokes and not enough substance___
___13. This course was:
•too early in the morning; I wasn't awake yet___
•at lunchtime; I was hungry___
•too late in the afternoon; I was tired___
___14. My (dog, cat, gerbil) (ate, wet on, threw up on) my (notes, paper, lab report, design project report) for this course.
___15. Other really sad story: _____

Caltrans Finds New Solutions to Roadside Management

by
Patty Clary, Director
Californians For Alternatives to Toxics (CATs)
Arcata, California

The peoples movement against roadside herbicide use in Northern California succeeded last year when transportation engineers stopped the practice and began seriously entertaining the notion that an integrated approach incorporating botany, non-toxic materials and engineered solutions might yet prove feasible and affordable.

The California Department of Transportation (Caltrans) maintains more than one-quarter million acres of roadside lands which lie in all areas of the state. Maintenance of this huge reserve of land has been approached almost entirely from an engineer's point of view: keep it clean, neat and hassle-free with as straight forward an approach as possible. The problem is how to keep views open for safety, protect the roadbed and prevent fires; spraying herbicides to kill all the vegetation back several feet from road edges and around landscape plantings has been Caltrans solution for nearly four decades.

But in some areas people have become increasingly annoyed with the idea that a state agency would spray dangerous chemicals on public facilities that virtually everyone must use, risking exposure to commuters, bike riders, children catching the bus, rural pedestrians, residents adjacent to highways and millions of others. Their concerns also extend to aquatic pollution: each year Caltrans uses hundreds of thousands of pounds of herbicides known to pollute ground and surface water, and it uses these along highways which drain to marshes, bays, streams and lakes all over the state.

Starting with protests by organic farmers against drift of the chemicals in the mid-1970s, residents of California's North Coast, especially in Humboldt County, voiced their complaints about roadside spraying. The Yurok and Hupa Indian Tribes brought a halt to spraying on highways within reservation borders several years ago, and county governments had bowed to public pressure to stop spraying on county-maintained roads along the coast from San Francisco to the Oregon border.

Threat of a lawsuit in 1988 forced Caltrans into a several year moratorium of spraying on the Northcoast. In 1996, when Caltrans resumed spraying, widespread opposition broke out in the form of demonstrations, arrests of activists blocking spray trucks and votes by county and city governments against the practice. Finally Caltrans submitted to the will of the people and stopped spraying in Humboldt, Trinity and Mendocino counties in 1997.

Transportation engineers need to broaden their view of what constitutes a transportation corridor in order to accommodate the wishes of the public. As Caltrans Northcoast director, Rick Knapp, said recently, "Until now we looked at roadsides as something that could slide down or out from under our roads; roadsides were just a support for the freeway. Now we need to learn to look at roadsides in a whole new light."

This change of perspective is coming to one of the largest governmental employers of engineers in the U.S. Road and bridge design, construction, materials assessment, repair and maintenance are the main activities of the agency, and all require highly skilled engineers. Although highway construction has slowed in recent years with centerline miles at 15,221 miles and many engineering jobs are now let to contractors under the privatization policy of recent governors, Caltrans remains an agency dominated by engineers of many different specialties. Where the future of roadside maintenance will go depends partly on politics and partly on the ability of a huge, cumbersome agency to change its direction.

Alternative means of roadside vegetation control are diverse and site specific, the opposite of the essentially silver bullet approach the agency currently uses in most parts of the state with its herbicide program. Using a diversity of site specific controls is called Integrated Vegetation Management, or IVM, and is increasingly embraced by highway agencies in many parts of the country as an alternative to herbicides.

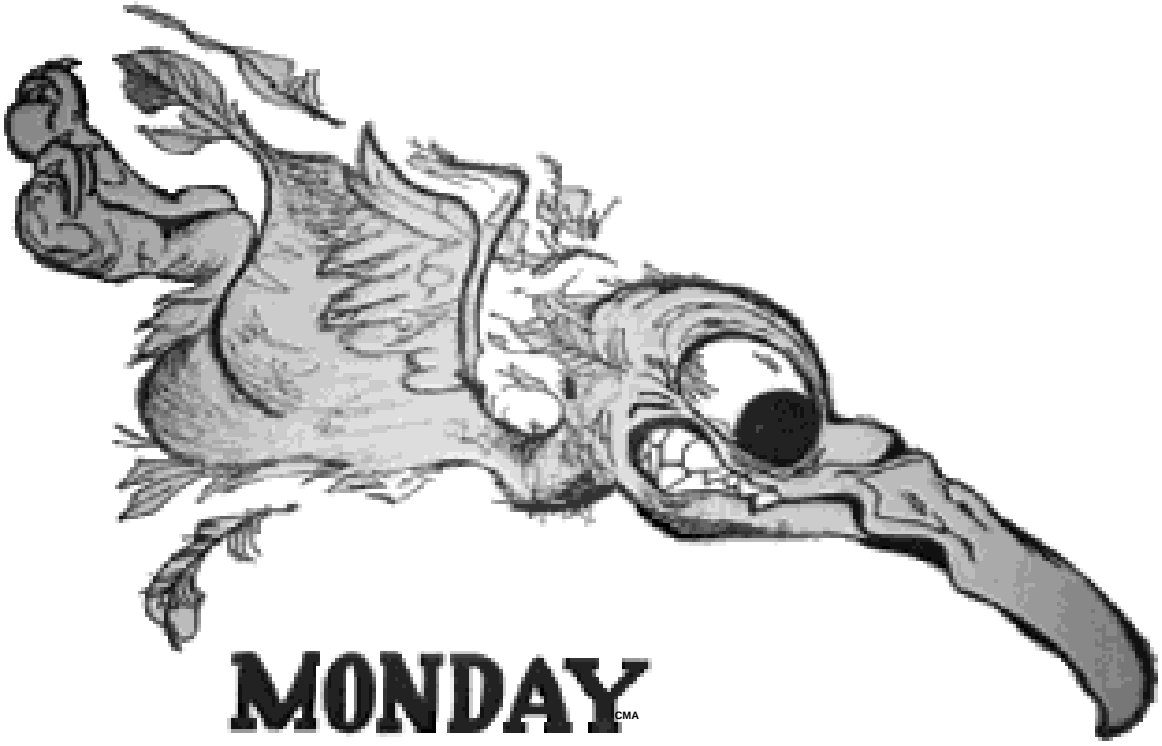
Caltrans is learning on the North Coast that IVM without synthetic herbicides does not necessarily mean not using herbicides nor does it entail eliminating engineered solutions. What it means is using a lot more imagination than in the past, and making a real effort to find and test new solutions.

In some cases the answer lies in changing the herbicide used. Corn gluten, a natural material that prevents weed seeds from germinating, was recently registered as an herbicide in California after undergoing extensive trials at Iowa State University. Caltrans is conducting several corn gluten trials this winter; one can be seen south of Eureka before College of the Redwoods on Hwy 101. Another natural herbicide, vinegar, kills many weeds on contact. Special vinegar formulation use will be registered soon in California and Caltrans plans trials in the near future.

Another solution lies in utilizing steam. Trackside vegetation managers for the railway in British Columbia devised a steam spray system utilizing old boilers and other patched-together pieces when citizen protests stopped track spraying ten years ago. Several years of use has proven that steam controls vegetation as well as herbicides, but the steam production machine used by the rail agency is

highly inefficient, and requires large amounts of water. Then a California farm machinery design engineer created an efficient steam machine by using a centrifuge to remove water from the steam and create a very hot vapor which kills weeds while using water very efficiently. Caltrans is currently purchasing a model for trials on the Northcoast.

The area of change that Caltrans will probably have the most difficulty making is in its attitude toward vegetation. Changes in materials and machinery is something engineers can understand, but the messy goings on of nature are another matter. Yet managing this huge land area spread throughout California is a great opportunity to save and display native plants. Caltrans is planning trial plots of native vegetation on the North Coast which, hopefully, won't experience the same fate as trial plots in other areas where road construction crews destroyed the plantings while undertaking other, more engineer-like, activities such as constructing, maintaining and improving highways.



Californians for Alternatives to Toxics (CATs) is a regional organization dedicated to eliminating the use of dangerous pesticides, and has been a leader in the effort to stop roadside spraying for two decades. CATs has joined forces with Caltrans engineers to find new solutions for vegetation management. CATs can be reached at 707-822-8497. **ERESA**

MTBE

• *continued from page 1*

how dangerous it is to human health. There are not only no restrictions on its use, but the state and federal environmental officials actually praise the contaminate for an undocumented reduction of auto emissions.

The South Tahoe PUD found itself in a crisis situation. As MTBE was discovered in well after well, it became obvious that a vigilant approach was needed. The District continued to deliver safe drinking water to customers by turning off affected wells and redirecting water supplies from clean wells, but the critical situation demanded difficult policy decisions, and the South Tahoe PUD developed three goals involving MTBE. The first goal is to raise awareness, and the District decided to "go public." Citizens were encouraged to "call, write, scream and yell," to demand aggressive testing and enforcement to find and stop MTBE leaks. It worked. The county staged an inspection blitz on South Tahoe gas stations and closed gasoline dispenser islands that had violations.

The second District goal, to clean up contaminated sites, continues to be an arduous task. The regional water board and the District combined efforts to spur remediation of contaminated sites. No site has yet been cleaned up and, in fact, it will likely take years, but the effort is ongoing.

The third District goal is to prevent future MTBE contamination. As long as MTBE is in gasoline sold in the Tahoe area, the underground aquifers that supply South Tahoe's drinking water continue to be at risk.

To gain essential public support and involvement, the District initiated a campaign to "Help Make Tahoe MTBE Free." The city council passed a resolution indicating that if the state and federal governments failed to act by April 1, 1998, they would consider a ban on gasoline containing MTBE. The county Board of Supervisors passed a resolution declaring El Dorado County an MTBE Free Zone and demanded that the state and federal governments ban its use.

There is still no action from state or federal officials. "MTBE is destroying our drinking water wells," one student writes. "Are you for that or against that?" A simple question. The right answer could stop the madness. **ERESA**

Summer Internships

by
Jeff Olsen, BS ERE 1998
Grad Student in Water Resources Engineering
UC Davis

Have you been looking for a summer job in the area and are frustrated by the few opportunities that available? Perhaps you want to gain some experience where you can learn new technical skills. A summer internship may be what you need. While there are a few internship opportunities available in the local area, there are many exciting programs in other parts of the country if you know where to look and have enough motivation to put time and effort into the application process.

When you apply for jobs, graduate schools, or scholarships, having internship experience can make your application stand out from the others. In addition, many employers now expect students to have work experience in addition to their degree. Participating in an internship program provides you with the opportunity to meet new people and establish future contacts for graduate school or employment. Internships are a great way to gain technical work experience related to you major with only a short term commitment.

Another benefit of a summer internship is the opportunity to live in a new area. This can be used to scout out graduate schools and future employers, or just to see a new part of the country. Some internships pay for transportation to and from the program site and also provide free housing. If you are uncertain about your major, it can be helpful to do an internship in your major field to help you decide if you really want to pursue that kind of work. Alternatively, you may want to apply for an internship in another field to see if you would prefer that type of work more than your current field of study.

Don't be hesitant to apply to internship programs because of a low GPA or a lack of work experience. Go ahead and apply anyway; internships are generally designed for students to gain experience. Often the GPA requirements are not exceptionally high. I have recently seen GPA requirements of 2.5 for some programs.

My summer internships provided me with great work experience, decent pay, a chance to see new parts of the country, and good additions to my resume.

Here is a summary of my summer employment and volunteer experiences.

National Science Foundation Research Experience for Undergraduates (REU) program
Utah State University, Logan, UT
research fellow
6/97 to 8/97

This research program was coordinated through the Dept. of Mathematics at Utah State. The program focused on various applications of nonlinear dynamical systems theory. My work involved a mathematical model of the earth's magnetic field. I used numerical approximations of the model equations to investigate the predicted behavior of the magnetic field. One feature of the model I examined was the period of reversals of the earth's polarity.

There were numerous possibilities for hiking and climbing in the Logan area. If you ever visit Utah State be sure to visit their renowned water resources laboratory.

Department of Energy Science and Engineering Research Semester (SERS)
Pacific Northwest Nat'l Laboratory
Richland, WA
research fellow
1/96 to 7/96

At PNL, I had the opportunity to work with a graduate of the HSU ERE program (and former classmate of Brad Finney), Lance Vail. I used an optimization algorithm known as a genetic algorithm (GA) to optimize groundwater remediation problems. GA's received their name because the solutions developed by a GA to an optimization problem evolve towards better solutions through simulated 'natural' selection. During the first part of the program I had to teach myself to program in C to use existing GA code. I learned quite a bit about optimization during my internship. Fortunately, I had just had Systems Analysis the semester before the program.

There were a lots of places to go in the Richland area for hiking, cross country skiing, mountaineering, and rock climbing. The desert of eastern Washington has a fascinating geologic history and there are many interesting places to see evidence of this history.

Arcata-Camoapa Sister City Project
Camoapa, Nicaragua
volunteer
6/94 to 8/94

A recent graduate of the ERE program, Vince Thompson, and I visited Arcata's sister city, Camoapa. Our work involved helping to improve drinking water wells, organizing a latrine building project, serving as ambassadors for Arcata at an international sister city conference in Managua, making a detailed assessment of the reliability and condition of Camoapa's drinking water system and water treatment methods, and meeting with national engineers in Managua to discuss improvements that were needed for the water system.

This is one of the best experiences I have ever had. I highly recommend taking advantage of any opportunity to work in a foreign country. It was great to live in a new cultural setting and be able to use several years of Spanish classes.

Hints on finding and applying for internships:

• Search on the internet. There are many opportunities out there, and even more opportunities for women and minorities.

• Utilize information and services at the HSU Career Center.

• Ask your instructors and students who have done internships for information.

• Have an updated resume and several copies of your most recent official transcripts ready in case you find out about a program right before the application deadline.

• Applications are usually due anywhere from January to March for the following summer. Get applications early so you can complete them over Christmas break when you actually have time to write quality responses to the application questions. Don't be afraid to write or email people to request applications.

• Many organization now have online applications. However, many applications are not available online. It is helpful to have access to a typewriter (and white out) for these.

The following is a list of potential internship sites.

Local sites

• Caltrans

• California Department of Water Resources, Eureka

• National Weather Service

• US Bureau of Land Management

• US Forest Service

• US Soil Conservation Service

Other sites

• Army High Performance Computing Research Center (AHPCRC)
http://www.arc.umn.edu/education/

• Associated Western Universities
http://www.awu.org/

• AT&T Research Labs
http://www.research.att.com/academic/

• CH2M Hill
http://www.ch2m.com/default.htm

• Central Contra Costa Sanitary District: CCCSD co-op position
5019 Imhoff Pl, Martinez, CA 94553

• Environmental Careers Organization, Inc.
http://www.eco.org

• Environmental Systems Research Institute, Inc. (ESRI)
http://www.esri.com/base/company/jobs/jobs.html

• Indian Health Service (IHS)

• Public Interest Research Groups
http://www.pirg.org/interns/index.htm

• US DOT: Summer Transportation Internship Program for Diverse Groups (for women and minorities)
202-366-1159

National Laboratories:

• Argonne National Laboratory
http://www.dep.anl.gov/

• Brookhaven National Laboratory
http://www.scied.bnl.gov/prg_cat.html

• E.O. Lawrence Berkeley National Laboratory
http://csee.lbl.gov/

• Lawrence Livermore National Laboratory
http://www.llnl.gov/llnl/02summer/xSEP97x.html

• Los Alamos National Laboratory
http://www.hr.lanl.gov/html/specprog/

• NASA-Ames Laboratory
http://huminfo.arc.nasa.gov/Students.html

• Oak Ridge National Laboratory
http://www.ornl.gov/seer/research/HELP.html

• Pacific Northwest National Lab
http://www.pnl.gov/education/index.html

• NASA
http://pao.gsfc.nasa.gov/gsfc/educ/educ.htm

• National Science Foundation Research Experience for Undergraduates (REU)
http://www.nsf.gov/home/crssprgm/reu/reulist.htm

• Science Applications International Corporation (SAIC)
http://www.saic.com/career/interns/index.html

• US DOE: Energy Research Undergraduate Laboratory Fellowships
http://www.orau.gov/doe_erulf/

• U.S. Dept. of Energy: Ames Lab
http://www.external.ameslab.gov/Community/educate.html

Finally, here are brief descriptions of three student work experiences that are very different from those I described above for myself.

Caren Coonrod
Caltrans
Eureka, CA
May, 1997 to present
Student Design Engineer

My supervisor was looking for someone who had computer skills. He wanted someone who was Mac, PC, and Unix literate and experienced in programs such as Microstation (Cad), Excel and Word. He also wanted someone who has completed a design project both independently and with a team. Very importantly, I think my supervisor was looking for someone who wanted to work and learn.

I learned Microstation and BEES (Budget Engineering Estimating System). I have worked on projects designing and budgeting drainage systems and highway realignments and widening. I have also worked on seismic retrofit projects.

Apply!! Put all your work experience on your application regardless of whether or not it is engineering related. Once you make it to the interview, convince them that you want to work for them.

Terri Reed
Mid Valley Engineering
Modesto, CA
last two summers
regular employee

My internship required knowledge of AutoCad. At my second interview, the CEO mentioned that he was looking for applicants who dressed properly and were well mannered. He was looking for potential employees who were versatile and willing to learn new things.

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Summer Internships

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I worked for a civil engineering firm. Skills I learned included: surveying, computing road grade surfaces, standard dimensions of specific utilities, how to put a plan portfolio together, and make contact and interact with clients.

I made a lot of connections with state and county government organizations and other potential future employers.

Advice? Don't be afraid to approach companies; just ask whether or not they have openings. Mid Valley didn't have an open position; they created one for me since I had a background in AutoCad. Don't wait until your junior year to start internships. Start now! If your internship is only one summer, look in another area the following summer (i.e. water area one summer, air quality the next summer). A variety of experience makes you more marketable. Don't be afraid to ask questions during your interview. They realize you haven't been in the field for 20 years. I personally think that they would worry if you didn't ask questions.

Dagan Short
Spencer Engineering and Construction Management Inc.
McKinleyville, CA
6/97 to present
Engineering Technician

I was hired to design a surface water monitoring plan for a local Indian tribe. Water quality experience, the ability to work alone or as part of a team, and computer skills were the main skills of interest to my employer.

Technical skills I learned on the job included AutoCad, GIS software MapInfo, and people skills such as diplomacy when talking to contractors and clients. Internships can give that extra edge when competing in the job market.

Take extra courses such as geology, AutoCad and technical writing. Do a senior project or an independent study that demonstrates that you are self motivated and can do independent work. **ERESA**

CCAT: A Living Example

by
Anne Dijoux
English (Single Subject) Senior Student

What was once a residential house on the brink of demolition is now a place that flourishes with practical environmentalism. The Campus Center for Appropriate Technology (CCAT) models a new way of urban living. Due to the many environmental issues, there is a growing need to appropriate our modern-day lifestyle and the technologies that support this lifestyle. The on-going process of adjusting one's needs to one's environment is often an issue questioned. Does appropriate technology imply that we are currently applying 'inappropriate' technology? Ultimately, the individuals and their environment are the judge of what is 'appropriate'. However, choosing one technology over another relies on one's values, beliefs, and the willingness to accept change. CCAT residents and volunteers have been struggling with this mix-match of values and actions ever since CCAT was first established.

Though it is not CCAT's role to clarify the underlying ideals that govern our technological needs, they do offer alternative ways to live a modern lifestyle. In a search to define what they believed to be appropriate urban living, CCAT student residents and volunteers have metamorphosed the house into a self-sufficient, earth-friendly dwelling. Recycling, waste management, supporting local business, and solar power are a few of CCAT's experiments. It is an on-going process that works through trial and error with an ever changing environment. Thus, there is always a need to continue the process by providing improvement or repair. CCAT represents a twenty-year collection of students' ideas of what they perceive to be eco-sound science applied in technology.

The experience CCAT offers is remarkable, and is the reason many students attend HSU. Hands-on participation is offered for a variety of classroom curricula ranging from Biology to Natural Resources. For example, the F1998 Engineering 305-Appropriate Technology class worked on several CCAT projects: a solar hot water system, a pedal-powered VCR, a greywater system, a drip-irrigation system, a straw-bale and cobb storage shed, a biodynamic/French intensive garden, a battery vent, and a composting toilet. The variety of projects reflects the environment in which students work to meet the needs of a modern household.

As a path of learning begins at CCAT, it extends to even broader horizons of the community and to other countries. CCAT offers tours for seniors, student at all levels, and international visitors. There are urban outreach programs that teach kids about the environment and the role they play within it. Local businesses are attracted to the profit gaining aspect of integrating hydro, solar, and pedal power into their revenues. Along with Arcata's unique marsh waste water treatment, CCAT is showing the progressiveness of HSU and Arcata.

Some may say that places like CCAT are like a slow moving disease, corrupting modernization. Others are aware that such examples display the ideas and knowledge of today's youth. The students at CCAT are educating themselves, the local community, and ultimately the international community. One of CCAT's Co-directors, Michelle Wallar, said, "I see CCAT's role not as Evangelical, but as offering alternatives to conventional technology." Earth-friendly methods often go against the trend. In technologically advanced countries, such as ours, we *do* set an example, because we are all teachers.

Contact CCAT at 826-3551 or ccat@axe.humboldt.edu, or visit http://www.humboldt.edu/~ccat/
ERESA

Mac McKee

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ribly naive and counter productive, and passing this impression along to our students is improper.

• Improve relations with the HSU administration. Confrontation with the administration is a stupid way to run the show.

• Improve accountability for the management of resources; make decisions regarding the allocation of scarce resources visible at the department and college levels.

• Conduct labs in labs, and maybe we will be less likely to lose lab space. (Over the years, we've lost SD-15, SD-17, and SD-151.)

• Allocate scarce teaching resources more efficiently. Reduce our reliance on part-time/temporary faculty, especially faculty who have no engineering training or experience, and especially for all design classes.

• Encourage all engineering faculty, just every now and again, to get outside and do some real engineering. That way they'll know whether the stuff they talk about in class has any meaning in the profession today.

• While the department should encourage the faculty to go out and do some real engineering, it should not subsidize the effort. All private-sector work done by the faculty should be kept out of House 18.

3. Now that the ABET accreditation is over, what do you think about the fate of the ERE program?

I've been through this enough times to know that it is a waste of time to stand around trying to guess what ABET will do. At the moment, a much more critical issue for the long-term survival of the ERE program is our declining enrollments. For the most part, I've thought that fussing over the ABET visit this time has been a little like arranging the deck chairs on the Titanic.

A particular concern is our lack of an earth sciences component in the curriculum and our anticipation of criticism from ABET about this. The fact of the matter is this: Our graduates will be in competition for jobs with young engineers who come from more traditional "civil and environmental" programs. Almost all of these people will have had at least one class in geotechnical engineering and soil physics. Folks, many of your future employers are going to expect you to know something about how things behave in soil, and most of the people competing with you for a job already have the jump on you. We have a more-or-less well equipped soils lab, we have an internationally recognized expert on our faculty in environmental geotechnology, and both are underutilized.

4. What is it that Utah State has to offer you that Humboldt State doesn't?

Let's see. A much higher salary. On January 1, I will take a new job as Professor of Civil and Environmental Engineering at Utah State University, with a joint appointment at the Utah Water Research Laboratory. Teaching responsibilities that involve only two classes per year, with average class sizes that will be much smaller than the ones I've had at HSU in the past several years. Graduate classes in water resources. A much higher salary. More resources, generally: money for equipment, travel, etc. A much larger and more diverse department, with a broader range of faculty interests and capabilities. A college of engineering, run by and for engineers. Good working relationships with other disciplines on campus (economics, sociology, political science, natural resources, etc.), all of which have something important to contribute to the solution of water resources problems. Built-in opportunities to work on some really interesting water resources problems in the state and region. Support and encouragement from the administration and my future bosses to continue to actively pursue international work in water resources. Did I mention a higher salary?

5. What goals and projects will you be working on and do you plan on working more outside the US?

There are a number of water resources projects in Utah and in the region that we will be working on. For example, we will be giving the state some help in updating the state water master plan. I think some of the things we did for the Palestinian master plan a year ago will come in handy in Utah. We'll probably also be doing some work relative to management of the Great Salt Lake.

There will be opportunities to do more international work: I'll be spending a few months in India each year for the next two or three years working on basin-scale water resources problems in the state of Orissa. I think opportunities will materialize to return to the West Bank and Gaza Strip soon, to begin work on the next phase of water development for the Palestinians. This will involve more detailed designs for implementing the plans we put together over the past two years. We might become involved with work on rehabilitation of the Gaza aquifer. These things, of course, will be profoundly influenced by the course taken in the Israeli-Palestinian peace negotiations over the next six or seven months. I believe the work we have already done will provide the Palestinians with useful information for those negotiations. It would be really great if we could help the Palestinians take whatever comes from the final status talks relative to water resources and figure out how to build a viable economy on it.

I would also someday like to write a book about water resources engineering and engineers in ancient cultures (on the Nile in Egypt, in the Tigris-Euphrates valleys in Mesopotamia, along the Indus and Ganges Rivers in South Asia, on the Yangtze in China, on the Mahaweli in Sri Lanka, maybe even tiny Wadi Musa at Petra, etc.), and how civil engineering contributed in very important, fundamental ways toward the development of civilization.

I'd really like to be able to afford a new paint job for my Camero, too. ERESA

Thanks for Making It Possible...

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