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Managing Debris from Wildfires and Other Disasters

by

Todd Thalhamer, PE (BS ERE 1992), Waste Management Engineer, CalRecycle, Sacramento, CA

There I was in an emergency debris meeting with twenty-five or so government agency representatives and emergency responders while a wildfire was still burning in South Lake Tahoe, and I heard myself say, "It's not that difficult." Just four words, but the entire room stopped and looked at me with total skepticism. Everyone there knew that nowhere in the United States had anyone ever removed such a large amount of fire debris from an entire community in anything approaching as few as 45 days.

It was July 1, 2007, and the Angora Fire had been burning for five days, engulfing 3,100 acres and destroying 248 homes and 8 other structures. I was sent from a small, obscure agency under Cal/EPA, the California Integrated Waste Management Board (now CalRecycle), to provide guidance on structural debris removal while considering the amount of ash that was on the ground and the potential impacts to the Lake Tahoe basin.

Was I an expert in disaster management? Or a nationally known environmental engineer with a graduate degree in engineering? No, I was just an engineer who was also a 15-year volunteer firefighter. I was currently working as a field engineer leading remediation crews on a number of environmental cleanups for Cal/EPA, and I decided to change the way government did business in four words. However, I knew that management at my agency would not be pleased with my confident and bold statement during a multi-agency meeting. But really, all I said

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The Angora Protocols – A New Standard in Debris Removal (Property at 829 Lake Tahoe Blvd, South Lake Tahoe, CA)

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FROM THE EDITORS

Hello from the Messenger staff! We hope you enjoy this Spring 2013 edition.

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"What does it mean, to understand? ...

I don't know."

Richard Feynman
Nobel Physicist
(1918-1988)

Alumni Profiles

Eric Zielke, P.E., LEED AP

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I was homeschooled during most of my middle school years, and I grew to love English and math. After high school I entered the University of Wisconsin – Eau Claire (UWEC) as an undeclared major, and I remember looking at a book by the Bureau of Labor Statistics showing the many different fields in engineering. I was hooked, but UWEC doesn't offer engineering, so I had to transfer to another school. But, which school?

I decided to participate in the National Student Exchange (NSE) program. This lead me to HSU, where I met Prof Mike Anderson and learned about the ERE program. I was impressed, and I decided to transfer to HSU.

As an ERE major, I tutored Statics and Dynamics, and I participated in work-study under Dr. Bob Gearheart. I also had an engineering internship with the Public Health Service - Indian Health Service (PHS-IHS), working one summer in Pocatello, ID studying an Ethylene Dibromide contaminated aquifer, and the following summer in Arcata on a surface water project for the Yurok Tribe. After that, I took a volunteer position in Guatemala, where I worked on a design/build micro-hydro electric project. I also had an amazing REU internship at Penn State University working on microbial fuel cell technology.

When I graduated from HSU, I took an entry-level engineering job with Caltrans in Eureka, CA, but I also started applying to graduate schools. I was accepted with financial support at UC Davis and Oregon State University, but my first choice was UC Berkeley, where I was accepted, but without funding. Fortunately, I was able to secure an Environmental Engineers of the Future (E2F) scholarship that provided up to $20,000 to acquire an M.S. in environmental engineering at select universities (including UC Berkeley).

As a condition of the scholarship, I signed a contract making a 3-year commitment to work for one of the participating companies after earning my M.S. degree. The Parsons Corp is one of these companies, and when I completed graduate school I accepted a position with them in Honolulu, HI.

Over the four years I've been with Parsons, I've collected and analyzed soil and groundwater samples on the islands of Oahu and Guam, and I've worked as a project engineer on a wastewater treatment plant construction project, as well as on mock-type urban warfare training programs on Oahu and the Big Island of Hawaii. However, the majority of my work has been making ASHREA level II energy audits, and I've performed hundreds of these audits at Air Force military installations in Alaska, Japan (including Okinawa), and South Korea. I have also acquired some important credentials; I am licensed as a PE in Civil Engineering in both California and Hawaii, and I have Certified Energy Auditor (CEA), Certified Energy Manager (CEM), and LEED AP BD+C credentials. I also have HAZWOPER and CQM certificates. I even became a PADI-certified diver while visiting Maui.

I really want to get across that the ERE program taught me a lot, and I'm thankful to all of my teachers. Please feel free to contact me with any questions, and let me know if you are ever in Honolulu and would like to meet up for a cup of coffee.

Alumni Profiles

Patrick Barsanti

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I was born in Scotia, California, grew up in Rio Dell, attended Fortuna High School, and studied mechanical drafting, construction technology, surveying, and architecture at College of the Redwoods. In 1973, Winzler and Kelly (W&K, now GHD) hired me to assist with industrial and mechanical type projects.

I got married in 1974, and worked for W&K until 1979. At that time, Selvage and Heber (now SHN) was formed, and I was hired to assist Duane Heber, M.E., as a mechanical designer/draftsman. Most of my work entailed mechanical and industrial design: heating, ventilation, and air conditioning (HVAC); plumbing; process piping; and energy-related projects for both industrial and commercial facilities.

In 1981, I decided to pursue an engineering degree at HSU. Going back to school after a ten-year layoff, and having three children and a house payment, was a major challenge. After ten years of raising a family, going to school and working, I graduated with a degree in Environmental Resources Engineering (ERE).

At HSU my emphasis within ERE was energy. However, in the late 1980's the local demand for environmental engineering was growing rapidly, and my emphasis in the consulting world changed to environmental compliance. Jack Selvage and Duane Heber of SHN were among the first of the engineers in this area to work on environmental projects, and I assisted them with preparing environmental permits for discharging wastewater; preparing storm water pollution prevention plans (SWPPP); preparing spill prevention control and countermeasure (SPCC) plans; preparing documentation for creating, operating, and monitoring woodwaste disposal sites; and implementing air quality programs to minimize air pollution.

In the 1980s, and again in the 1990s, the timber industry took a downturn, as did mechanical and industrial engineering. As the mills and industrial facilities closed, the properties where they once operated required environmental evaluations and mitigation measures. Since the early 1990s, I have investigated and cleaned up many industrial and commercial sites, and several of these have been re-developed.

In my many years of working with consulting engineers, I have discovered that there are many different types of engineers, and that projects can vary widely. My work in consulting is interesting and fast paced, and I enjoy it. However, consulting engineering is not for everyone since there are budgets and time constraints that must be met.

HSU provided me and many others with the tools necessary to work in the challenging and rewarding field of environmental engineering. This has allowed me to make a good living in Humboldt County.

I have worked with some great professors at HSU, and I thank them for their assistance and friendship. Over the last 35 years I have worked with some of the top engineers in this area, including Bob Kelly, John Winzler, Jack Selvage, Duane Heber, Jeff Nelson, Travie Westland, and Marty Lay.

My story is not primarily about what happened after HSU, since I graduated when I was 40 years old. However, HSU was part of my journey, and continues to be, as many HSU students have gotten their start with SHN.

Success is what you determine it to be, and I can say that I have had a successful career working on the Northcoast. Now, in my later years, my family, friends and colleagues have made me look at success differently. Now, I think of it less in individual personal terms, and I work to assist others in achieving their goals and dreams.

Brad Shipley

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In 1987, five days after my ERE Senior Project presentation, I started my professional career as a Federal On-Scene Coordinator (OSC) in the U.S. EPA's Region IX Emergency Response Section. According to the Comprehensive Environmental Response Compensation and Liability Act (CERCLA), the OSC responds to releases of hazardous substances to the environment, and coordinates with state and local agencies, and the responsible party, to mitigate the human health, welfare and environmental threats posed by the release.

Over my 17-year career with the EPA, I was involved with numerous emergency response and time-critical CERCLA removal actions. The highlights of these are the Exxon Valdez oil spill in Alaska, the Cantera Loop railroad spill of

Alumni Profiles

metam sodium into the Sacramento River, mine tailings stabilization at the Sulfur Bank Mercury mine at Clear Lake, dismantling a pentachlorophenol wood treatment facility in the Stockton harbor, plating shop fires in LA, and groundwater treatment for 1,2-Dichloropropane at the Del Norte County Agricultural Station in Crescent City.

I also conducted response actions in Saipan, Guam and the Marshal Islands addressing cleanup projects involving pesticides and polychlorinated biphenyls (PCBs) from WWII-era transformers brought there by the DOD. The OSC also manages Emergency Support Function #10 under FEMA disaster responses, and in that role we collected, segregated and properly disposed of all the hazardous materials from debris cleanup operations after typhoons, such as batteries, paint, refrigerants, and asbestos-containing building materials.

In 2001, I took a 2-year detail at BLM in Nevada to help manage the Yerington Copper Mine cleanup operations and guide it through the CERCLA remedial process. In 2003, I started my current position with the USDA Forest Service as their Regional On-Scene Coordinator for the Pacific Southwest Region. I am based in Nevada City, California in the Tahoe National Forest, and I manage non-emergency cleanup operations, mostly at abandoned mine sites and occasionally old landfills. My current projects include operating the recently constructed bioreactor to treat acid mine drainage from the Golinsky Mine on Lake Shasta, and constructing a Group A mine waste repository for uranium and radionuclide-contaminated waste rock at the Juniper Uranium Mine near Sonora Pass. Most of this work was done through government contracts that I manage in my federal capacity as an environmental engineer. **END**

Our ERE Study Group:
A Success Story

by Kevin Kopp, Britlandt Abney & Andrew Preiksa
ERE Seniors

We all heard about them either before we entered college or when we got here, from our parents or our teachers, as a recommendation or a necessity. "Be sure to get a study group so you understand the material" and "developing study groups will put you into a good habit" are things that we are used to hearing regarding college. But have you ever heard that a study group isn't a study group without chicken nuggets and carefully crafted dipping sauce? With four years of experience each as an ERE major, we're here to pass along how our study group came to be, what makes it work, and other things you should know about forming one.

Mike Anderson's Dynamics course propelled this study group because it was the most difficult course any of us had taken up to that point. Kevin Kopp started to struggle with the material early on in the course, and he asked Brit Abney if he wanted to meet once or twice a week to work on the homework. Originally, the study group was made up of Kevin, Brit and Ben Stern. Other people would occasionally join in, but these three were the only consistent members. As the semester progressed, and the homework became even more difficult and took longer to complete, we began to spend more time at our study sessions. This is when Andy Preiksa joined the group.

We all took Thermodynamics, Materials, and Systems together the following semester. We met three days a week for 1 to 4 hours each session, usually devoting an entire meeting to one course. We met at Andy's house and worked solidly for an hour, took a break to eat chicken and macaroni and cheese, and then resumed working. This was essentially how every session went, and we found that the breaks gave us the chance to socialize and reduce stress. The three of us have taken the same engineering courses together ever since.

The format of our study groups varies depending on the material we're studying and the assignments that are due in the near future. To save time, each of us shows up at the meetings having completed any preparation needed to do the homework. If we all understand how to complete a problem, we spend most of our time individually working that problem

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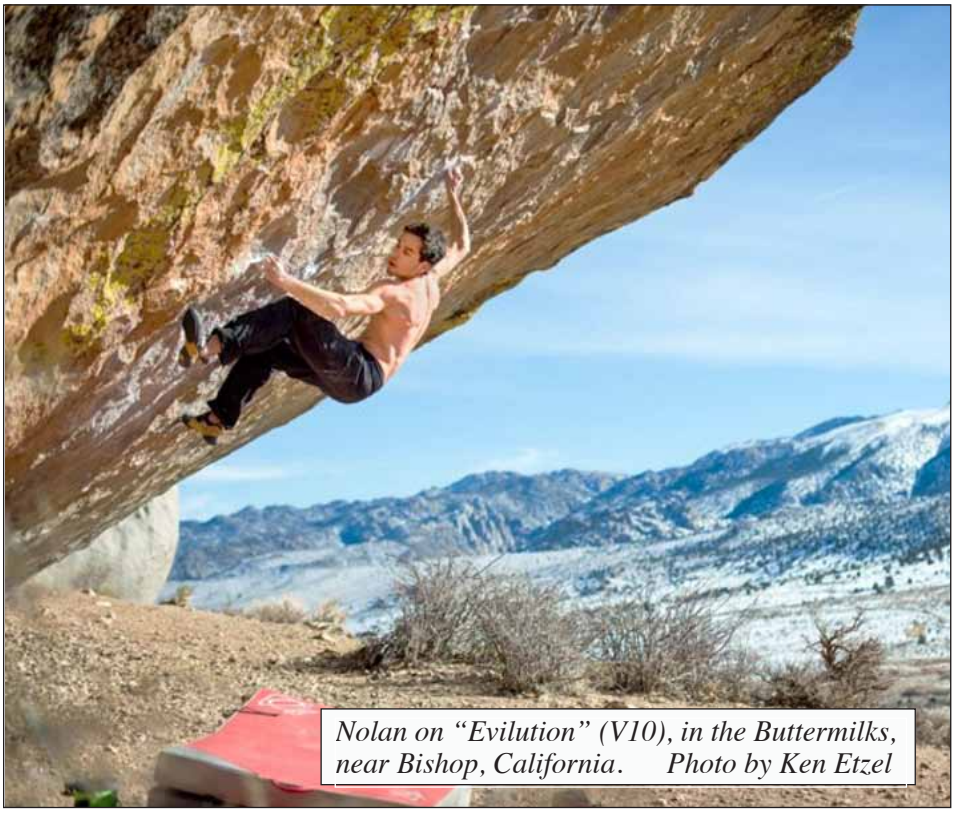
Brit, Kevin and Andrew

A Balance of Passions:
ERE and Rock Climbing

by Nolan Kloer, ERE Senior

For the past five years I've been double majoring in ERE and Rock Climbing. The two create a balance as complimentary opposites of each other. One lets me nerd out all night on optimization algorithms to the gentle hum of Science D, while the other lets me hang out all day on a rock with the bugs. I would not be able to function well in either area of study by itself, so keeping this balance is essential. So, as you can imagine, I was devastated when I injured my finger in 2009 and could not climb for nearly four months. Quite the dilemma, let me tell you. Suddenly, I had to find a new outlet for roughly half my energy, or face going stir-crazy from staring at computer screens for too long. Luckily, around that same time the USA Collegiate Climbing Series was hosting its second season of national competition. My climber friends and I got word that, if our school were able to field a 6-person team, we could compete with other colleges, of all sizes, from all over the country. To get support from HSU to compete, all we had to do was formalize as a sports club. Simple, right? And just like that… I had an outlet.

The Student Climbers' Coalition (SCC), informally known as the HSU climbing team, was started in 2009 by a group of ardent climbers who wanted to strengthen their then-fledgling community. The founding members are: me, fellow ERE student Craig Cooledge, Forestry students Ryan Camera and Alex Borst, and a few of our other bonobo-like friends. Due to my bum finger, I had the free time to write up a constitution and put though the necessary paperwork.



Nolan on "Evilution" (V10), in the Buttermilks, near Bishop, California. Photo by Ken Etzel

Fast-forward to 2013, and the SCC is 27 members strong, in its fifth season of competition, and positioned to win its third consecutive regional championship. HSU is in the Northern California and Northern Nevada Region (USAC NorCal), and we won the regional championship in 2011 and 2012. We also represented HSU at the national championships those same years, where as a team we placed 2nd and 10th, respectively. Due largely to the visibility brought on by our success at competitions, we now have students coming to HSU specifically for climbing.

A little irony is in order here, however, as our team does not thrive off of competition. In fact, most of our members began climbing to escape the competitive aspects of other sports. Perhaps we are driven by our shared passion for sore fingertips… or, perhaps it is our common desire to have fun while working to get better at something.

For Craig and me, the climbing club improves our college experience by offering us a community to associate with outside of the classroom. This community is inclusive, and built upon a framework that allows for the free exchange of ideas and information between members. Anyone may join regardless of skill level. Furthermore, anyone is allowed to offer their input to improve group culture or team operations, so long as it is constructive. This unconventional approach to coaching is well-suited to the sport of climbing (which generally attracts participants who are unconventional by nature) because it enhances serendipitous collaboration between team members. Often, there are multiple ways to work through a series of holds to get to the top of a climb. A sequence of moves that works for one person might not work for another person who has a different body type. Planning for serendipity thus increases the potential for those little "aha" moments to take place

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ERE Study Group

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on paper, asking each other quick questions about equation format, constants, or things of a similar nature. When further discussion is needed, we often utilize a white board. This lets us work through problems conceptually as a group. We have found white boards to be efficient props for getting all of our ideas out on the table in a semi-organized form. Before tests we also use white boards to review and prepare crib sheets (which we usually prepare together to avoid forgetting useful information).

Asking questions in general, and critically but politely questioning your group members, are key to understanding the material. Working through problems is easier when you have other minds to work with, and questions often lead to collaboration and better answers. Questions also help us catch mistakes. We have often found mistakes when one member asks a question instead of just following the group. When the entire group gets the same wrong answer, we all lose.

Interestingly, the elements that hold our group together are not related to engineering concepts or the classes we are in. Specific foods, music, and inside jokes help to make our study groups enjoyable, and the group can be productive for longer periods of time. However, while the ways we entertain ourselves during our study sessions have brought us closer together as a group, they have often made it more difficult for other students to study with us. Some other students find our jokes and food breaks to be more of a waste of time than helpful for studying. Each group must develop its own organization and methods of dealing with the stress that inherently comes with being in this program. Our stress relief just happens to be pop music and chicken nuggets while slowly attacking homework problems.

Our study sessions help us complete tasks, stay updated with what has to be done, and refresh our memories on material that has been previously covered. They help us focus on understanding material and finishing work on time. In addition, they help motivate all those in the study group to push themselves academically and find the strengths they possess. Everyone has something to bring to the table and a study group is a great way to find out what that is for you. Our group helps us all to understand concepts and material in our classes, finish our coursework efficiently, improve our own personal study skills, and grow friendships. And while we get our work done on time, we like to have fun, too. Repetitive listening to cheesy pop songs, talking about last night's episode of our favorite TV show, and eating copious amounts of chicken are just the tip of the proverbial iceberg in terms of the fun the three of us have together.

In college, of course, there is more to be done than simply attain a degree. We grow as people and form friendships that may last the rest of our lives. Your next Sunday night study session could help you experience this. Don't take on the next four (or more) years alone. Even if you feel confident working alone, a study group will help you in the long run and is much more fun. Ω

Balance of Passions

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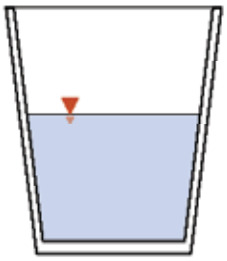
during practice. The general premise is that someone else often knows better than you how to solve your problem or take advantage of your situation. So far, operating under this assumption has led to many successes for our team and its members. In addition to efficient coaching, these include personal scholarships, team sponsorships, friendships with climbers at other schools, travel opportunities, fame, and fortune. Well… okay, the last two might be stretching it.

Without the passion of its members, there would be no purpose for the SCC. Without the club, there would be no product to represent the strong climbing community at HSU. The principle at work here can be applied to any endeavor, whether it's scrambling around piles of rocks looking for the next climb, or minimizing frictional losses through a pipe network. Shared passion provides the foundation for valuable growth. So, go and create your own "double major." Find something that makes you feel giddy, and pursue it! If you're not interested in anything that's currently out there, then start something new. There is a good chance there are other people out there who will want to join you.

For more information about the Collegiate Climbing Series, visit: http://usaclimbing.net/ccs/home.cfm

For more information about joining or starting a club at HSU, visit: http://humboldt.edu/clubs/ Ω



A GLASS OF WATER

To the optimist,
the glass is half full.

To the pessimist,
the glass is half empty.

To the engineer,
the glass is twice as
big as it needs to be.

First Engineering Job

by
David Leopardi, PE, Scheduling Manager
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It was the morning of the first day of my new job at the Los Angeles Department of Water and Power (LADWP), and I was staying with a friend in West Los Angeles. I started to work on my 1977 Puch moped, and I stopped at a gas station and asked for directions to "downtown." This brought me to downtown Santa Monica. However, I knew I was going in the wrong direction when I saw the waves breaking on the beach. I turned around and putted the now 20 miles in the opposite direction to downtown Los Angeles. LA traffic on a moped… definitely no cup of coffee required! I commuted this way for a couple of months until the moped got stolen, and I bought a real motorcycle. Freeways and lane splitting, but that's another story.

This was in January 1980. I had just finished my civil engineering degree at the University of Utah, and I was at the front end of a hiring spree at LADWP to replenish the engineering ranks that had dwindled over the years due to retirements. I was assigned to the Power Division, which supplies electricity to the City of Los Angeles.

As a new Civil Engineering Assistant, my first assignment in the rotation program for new hires was in the environmental engineering group. One of the tasks the group performed was testing for the presence of PCBs in the oil used in large capacitors located at electrical substations. PCBs are known carcinogens, and when they were detected, the capacitors were taken out of service and the oil replaced.

David Leopardi (left) with a co-worker, attending to the civil earthwork portion of the Intermountain Power Project in Springville, Utah (1984).

LADWP owned and operated several coastal steam cycle electric power plants. The fossil plants burned heavy oil in a boiler to generate steam that spun a turbine and generated electricity. After leaving the turbine, the steam condensed back to water by using cooling water from the ocean. Quarterly, the plant operators performed a "heat treatment" of the cooling system to eliminate buildup of biomass in the large pipes that brought the water to and from the plant. The biomass consisted of seaweed and fish. The operators would close the valves and re-circulate the water through the condenser, which would raise the cooling water temperature. Lobsters would sense the rising heat, release from the concrete pipe, and wash into the collection racks alive. We then transferred them back to the ocean. The fish weren't as lucky. California Fish and Game required us to quantify the fish kill by species, number and by total weight. This smelly job was mine.

My next rotation was to the civil/structural design group. I was assigned the task of designing access roads along a proposed transmission line from Los Angeles to Delta, Utah. A new coal-fired power plant was slated to begin construction in 1982. Fortunately, I had help, so I wasn't the only engineer assigned to this access road project along the 750-mile transmission line. One structural project I was given was to raise a transmission tower located in the middle of the Mojave River near Barstow, California. The river was dry most years except during the spring after a heavy winter. During these rare episodes, the water would erode the foundations, and there was concern that the tower would collapse. We built a large enclosure around the tower made of Gabions, which are welded wire mesh rectangular cages that are filled with large rocks and stacked on top of each other. Extra height was required for clearance between the conductor and the ground.

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Disaster Debris

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was that someone just needed to get the homeowners to sign right-to-enter permits, coordinate the debris removal in a uniform manner, develop a set of removal protocols, and select a cleanup standard.

I didn't know that a representative from the governor's office was at the meeting. The next day he memorialized my concept in an executive order that declared a State of Emergency as a result of the wildfire in El Dorado County, and required all State agencies with responsibility, regulatory authority, or expertise related to recovery efforts in connection with the Angora Fire to cooperate fully and act expeditiously in coordination to mitigate the fire effects on the Tahoe Basin. The order also stated that:

"… statutes, rules and regulations, as they apply to the removal, storage, transportation and disposal of hazardous and non-hazardous debris resulting from the fire and other requirements related to necessary restoration and related activities … are hereby suspended to the extent necessary for expediting the removal and cleanup of debris from the fire…"

The order further required that state agencies work with local officials to design and implement a comprehensive structural debris removal plan that would treat the removal of structural debris as a single organized project. Well, guess who got that assignment? No good deed goes unpunished. So, on the night of July 2, 2007, I sat down at my computer and wrote the Angora Protocols, which detailed how my agency was going to implement a comprehensive structural debris removal project.

After 15 hours of panic and a few moments of enlightenment, I had the 35 page draft plan ready for the July 3 agency meeting, where I faced the same group of officials and emergency responders who were present when I had said, "it's not that difficult." Luckily for me, the task force endorsed my plan, but I was surprised when it also selected me to lead the effort in South Lake Tahoe under a unified command. I was again in panic mode! I had two days to develop a set of protocols to remove the ash from a community in 45 days, design place erosion control for 256 lots, and remove 8,000 trees, all without negatively impacting the surrounding community a second time. It hardly seemed possible.

On July 5, 2007, I presented my plan to a group of 550 community members at a local elementary school, and asked them to sign up under this new "State" program. Now really, would you sign up for anything the State of California offered to you? Trust me, I was as skeptical as you are right now, but there I was with the community members and every elected official in the South Lake Tahoe basin. That night the disaster task force convinced 51 of the 256 property owners to sign up, and eight days later CalRecycle mobilized its response contractor and consultants to: 1) remove burned debris and ash, including destroyed cars, foundations, building materials, large appliances, and household contents; 2) perform confirmation soil sampling of the cleaned up building sites; and 3) install interim erosion/storm water run-off controls. During our first six days of work the number of property owners who signed up for the program went from 51 to 109, and in the next seven days the number grew to 180. After the first three weeks we had 230 of the 256 property owners. During our last day of ash removal, the last homeowner finally committed.

So, what was the real key to the success of this new protocol? Why had this not been done before? First of all, three factors came into place: 1) we had an executive order waiving most regulations, 2) the entire watershed emptied into a single lake, Lake Tahoe, and 3) the home of the Water Board's executive chief was among those burned down. But in the end, it came down to the disaster funding. Previous coordinated debris removal programs in California had addressed only the removal of ash and debris from a public right-of-way, while this new program also

First Engineering Job

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The structural design of the tower extension required 3-D vector analysis to select the angle iron members for the lattice structure. No computers back then… just free-body diagrams.

My last rotation was in the quality assurance group. Assignments ranged from construction quality control activities to acceptance of vendor-furnished equipment and materials. At around this time (1982) LADWP was just starting construction of the coal-fired plant in Utah mentioned above, and I spent most of the next ten years as a project manager working at this new plant.

In 1993 we were wrapping up a program designing and installing improvements to the plant, and it was almost time to relocate back to Los Angeles. I was married by that time, and my daughter, Holly, who is now a senior Physics and Chemistry student at HSU, was then 2 years old. I didn't want to raise her in LA, so I found another company to work for.

I have worked for five different companies since leaving LADWP. Mergers, layoffs, and requirements to relocate to bad locations were the reasons I changed companies. In every case the change was positive both mentally and financially. For the past ten years I have been working for a defense contractor on the Intercontinental Ballistic Missile (ICBM) weapons system located in Montana, North Dakota, Nebraska, Wyoming and Colorado. Who would have thought… Civil Engineer to Rocket Scientist! Ω

considered the potential impacts of the ash on the community and environment. The agencies determined that in this disaster the economic and environmental effects of leaving the debris removal to each individual homeowner, on their timelines, had the potential to be devastating to the surrounding community and the fragile Lake Tahoe ecosystem. Agencies recognized that the speed at which a coordinated debris program could be completed was crucial to limiting the amount of environmental damage to the community, the land, the creeks and Lake Tahoe.

In most fires, debris removal is normally completed by individual homeowners. Typically, most of the ash and debris is not removed for three to six months, with some of the ash taking up to 18 to 24 months to be removed. Prior to Angora, state and federal disaster funding in California reimbursed only the removal of ash and debris from a public right-of-way. Since this disaster did not qualify for federal disaster funds from Federal Emergency Management Agency for structural debris removal, only state disaster funds were used for the structural debris removal. By using only State disaster funds, there were fewer restrictions on how the funds could be used. In this response, as long as the homeowner signed a Right-to-Entry Permit, all above-ground impacted items, except for tree stumps, were removed. For the first time in state disaster funding, funds were directed toward removing all fire-related debris from a private land. Specifically, the funds were used to remove concrete foundations, chimneys, and other structural items that were typically left behind. This new concept provided the homeowner with a certified clean lot, with no debris remaining except for structures that were deemed critical for erosion control, and that was ready to build on or sell. To complete this mission before winter, disaster funds were made available to the County to remove the debris from private property. For homeowners who signed the Right-to-Entry Permit, CalRecycle and its contractors assumed responsibility to clean up the property. Once the property was cleaned and approved by the county for re-occupancy, the owner was required to reimburse the County the amount their insurance provided for debris removal. The funding matrix for this protocol, which was as innovative as the removal concept, was as follows: 1) if the removal costs exceeded the homeowner's insurance coverage, incident funds would cover the remaining costs, 2) if the removal costs were less than the homeowner's insurance coverage, the homeowner had to pay only the actual removal costs, and 3) if the homeowner did not have insurance, incident funds would cover 100% of the removal cost.

By accounting for the cost of the incident up front in this manner, the meaning of the directive became clear: protect the community and Lake Tahoe.

There were many other factors that helped this protocol work, including the incident command system, and the "three-year-old" cleanup standard. Yes, I used my three year old daughter to convey how the lot was supposed to appear after the cleanup. As the operations section chief, I said I wanted the lots to be cleaned to the point that a three year old could walk across them without health or safety issues. Everyone working on the project understood this "working standard." Officially, we used California Human Health Screening Levels (CHHSL) to evaluate levels of metals in the soil, but the other standard worked as well.

Nearly 65,000 tons of material were removed by the contractor during 39 days of fieldwork activity, and the County's contractor removed an additional 8,500 tons of burned timber. More than 3,500 truck loads of material were removed from the Angora burn area. The total cost for this emergency response and cleanup activities exceeded $7,300,000. CalRecycle received full reimbursement under the Disaster Response/Emergency Operations Account, and more than $3,500,000 was recovered in insurance and escrow payments.

The average size of a home in Angora was 1566 square feet (SF). The cost to remove a home varied from a low of about $13,000 to a high of about $80,000, with an average of just under $30,000. This equated to a unit removal cost of just under $20/SF.

This program removed 256 structures in 39 days using 28,000 labor hours, removed more than 8,000 hazardous trees, placed erosion control on the vacant lots (within the required 120 day deadline), and resulted in no reportable injuries or accidents. One year after the fire, more than 180 homes had been rebuilt with more than 50 additional homes scheduled to be completed by the end of 2008. The Angora Protocol was a success both in assisting property owners in rebuilding their homes and in protecting the environment. These protocols have now been used to clean up other major disasters, including the 2007 Southern California Wildfire Storm, the 2010 San Bruno Pipeline Explosion, and the 2011 fire storm in Canada.

Lesson learned: engineering a project is easy; leading a work force and community back from the brink is another thing altogether. Ω

"Speak only if it improves upon the silence."

Mahatma Gandhi (1869-1948)

ERE News

Sabbaticals and Visiting Faculty

Compiled by
Lianna Winkler-Prins, ERE Senior

ERE Professors Eileen Cashman and Beth Eschenbach will both be going on sabbatical during the Fall 2013 and Spring 2014 semesters. Faculty can request a sabbatical every seven years, and they do so by writing a proposal that explains why their sabbatical time will benefit HSU. The proposal must be accepted by the department chair, the dean of the college, a committee of university faculty, and the provost. In order to fill in the gaps created by Professors Eschenbach and Cashman's absences during the next academic year, ERE Alum (BS 2005) Doug Saucedo will be a visiting faculty member. Below, Professors Eschenbach and Cashman describe their sabbatical plans, and Doug Saucedo introduces himself.

EILEEN CASHMAN
During my sabbatical, I have proposed to work on three separate projects. For the first project, I will conduct a hydraulic analysis of the newly developed receiving wetland at the Arcata Marsh to determine the water quality characteristics of the mixing basin as treated wastewater from the marsh mixes with brackish water from McDaniel Slough. Specifically, I plan to perform a modeling analysis of the mixing basin that couples the pollutant removal processes (such as settling and biological degradation) to the system's hydraulics and abiotic factors. For the second project, in collaboration with ERE Emeritus Professor Robert Gearheart, I will develop course materials for ENGR 455 "Engineered Natural Treatment Systems," an upper division senior design elective. Both of these projects will take place from August through February.

Then, in March 2014, I will travel to Brazil to work on my third project as a Fulbright Scholar. I will work with colleagues at The Federal University of Western Para (UFOPA) in exploring the feasibility of developing micro hydroelectric systems in the Tapajós river basin. The River is named after the Tapajós Indians, a tribe of Native Americans from Santarém, Brazil. In addition to social and environmental issues, the demonstrated link between soil erosion and the mercury enrichment of fine sediments in the Tapajós River calls for careful consideration of sediment erosion that may result from any hydroelectric development activities.

BETH ESCHENBACH
For my sabbatical, I will be going to Central Queensland University (CQU) in Rockhampton, Australia. My husband, HSU Physics professor Wes Bliven, and I will be hosted by Professor Euan Lindsey, Dean of the CQU School of Engineering and Technology, and an education research colleague. I will be working on a variety of projects at CQU, but the two main hats I will be wearing will be engineering education researcher and environmental systems researcher. My work will be in collaboration with the faculty in the School of Engineering & Technology and with environmental economics researchers at the Centre for Environmental Management. Although I have been active in engineering education and environmental systems engineering, I anticipate learning some very different ways of thinking about issues in these fields. I hope to bring back some new approaches to teaching engineering courses, as the School of Engineering & Technology at CQU prides itself in its innovative teaching approaches, especially with "project based learning." I also hope to bring back new projects in environmental systems engineering. Meanwhile, Wes will be spending his sabbatical at CQU working on the electronics of an underwater robot that could be used for water or sediment sampling.

DOUG SAUCEDO
I graduated from the ERE program in 2005 after several eventful years of hydrogen competitions and helping to start the Renewable Energy Student Union. After graduation, I earned a master's degree in Mechanical Engineering from UC Davis while studying the design and control of plug-in electric vehicles. This lead me to my current position at the Electric Power Research Institute's Electric Transportation group in Palo Alto, where I have been for the last five and a half years.

Last year, while I was looking for job opportunities in the Humboldt area, my friend and colleague, T.K. Williams, pointed me toward the visiting professor position being advertised by the ERE department. ERE was looking for someone who was familiar with the ERE curriculum and could teach full-time. I will be teaching ENGR 313 "Systems Analysis" and ENGR 325 "Computational Methods II." Both subjects are critically important in developing the skills needed to become an effective engineer, and I enjoy them greatly. I hope to pass my enthusiasm for these topics on to my students, and also provide a different perspective on how they can be applied in the engineering discipline. I look forward to working with the ERE department faculty and students in the 2013-2014 academic year. Ω

ERE Clubs Information Board

Compiled by Lianna Winkler-Prins, ERE Junior

Organization	Spring 2013 Activities	Fall 2013 Planned Activities
Environmental Resources Engineering Student Assn (ERESA) **Email:** eresa@humboldt.edu **Webpage:** http://www.facebook.com/hsu.eresa	• Monthly Meetings: Announcements Networking Snacks • Coffee Table • Mock Interviews • ERE Rafting Trip • Graduation Reception	• Monthly Meetings • Coffee Table • Welcome Back BBQ • Pizza with Professionals • Fall Follies • Tours of Engineering Firms • All Clubs Meeting
Engineers Without Borders (EWB) **Email:** humboldtewb@gmail.com **Webpage:** http://www.humboldt.edu/ewb **Donate:** http://www.ewb.usa.org/chapters.php?ID=597	• Continued projects in Camoapa, Nicaragua (with North Coast Professional EWB) • Collected precipitation data • Re-design and re-build the demonstration Rope/Ram pump • Identify a local project for the student chapter to work on	• Sister City Project's I-Block Party • Continue projects in Camoapa, Nicaragua (with North Coast Professional EWB) • Re-design and re-build the demonstration Rope/Ram pump • Identify a local project for the student chapter to work on
Renewable Energy Student Union (RESU) **Email:** resu@humboldt.edu **Webpage:** http://resu.humboldt.edu **Mailing List:** renewable_energy_student_union@google.com	• Solar hot tub project • HWMA solar array study • SORMS data collection • Bike-powered blender for Laurel Tree Charter School • Design and build educational micro hydro system • Solar pathfinder readings at Jefferson Project site • Field trip to Rock Creek Ranch	• SORMS data collection • Find use for donated solar thermal cells • Solar pathfinder readings at Jefferson Project site • Continue educational micro hydro system project • Electric wheelchairs using renewable energy study
Society of Women Engineers (SWE) **Email:** swe@humboldt.edu **Webpage:** http://humboldt.edu/clubs/club_sites/society_of _women_engineers1	• Attend 2013 Region A SWE Conference in Santa Cruz • PRO (Press Reduced Osmosis) Project with ERE Prof Achilli • Brown Bag Lunches • Girl Scout Day • 3rd annaul SWE Social • ERE end-of-year BBQ	• PRO Project • Brown Bag Lunches • Annual SWEshi • STEM (Science Technology Engineering and Math) advocacy in local elementary school

Get Involved: Learn, Lead, Help, Enjoy

Project Brad and Operation Willis

by Kayla Williams, ERE Senior

One day not so long ago, in a Science D not so far away, an engineering disciple had an idea. This idea infiltrated the halls and minds of ERE students. Troops gathered, thrift stores were ravaged... and on the Day of the Dead it became reality. Fondly dubbed 'Project Brad,' Comp 3 students and other brave souls showed up to lecture copping the colorful style of the admirable Dr. Brad Finney. His entrance was momentous -- slouched in the doorway, eating an apple, surveying the damage that lay before him. Some may never look at that doorway the same way again. Fast forward one year and 'Operation Willis' is in its final stages of execution in Groundwater lab. Never slouched, the legend himself articulated, as archetypal, a response that moved even the most obdurate pupils. There was no crying over assignments that day, except for tears of joy. Thus began a tradition: one of honor, unity, and humor. As I inch toward graduated freedom and look forward to life outside of these walls, I'm comforted with the proven power of an idea. Until then, I leave you with this... Project Lang?

Project Brad

Operation Willis