

What's next in solar power

Undergraduate applications highest ever



Winter 2008-09 Volume 98 Number 4

Mines

Colorado School of Mines Magazine

Writing Matters
The ABCs of Engineering



A Message from the President

16 January, 2009



Like many publicly funded universities around the country, Colorado School of Mines is feeling the effects of the economic downturn. Even though the situation is changing rapidly, I want to include a brief message in this issue of *Mines* magazine outlining where things stand today; a similar letter was sent to campus earlier in the new year.

Our biggest concern is that because the state of Colorado is anticipating a revenue shortfall this year and next, state funding for Mines is likely to be cut. This appears inevitable because the Colorado constitution mandates a balanced budget while at the same time protecting certain major budget allocations from cuts. As a result, revenue shortfalls must be absorbed by the allocations that remain, including higher education. Currently, state funding makes up about 14 percent of Mines' total operating budget.

While the media will continue to cover the issue and make early projections on how much higher education will shoulder, the true scope of our challenge will not be known until later this spring when the governor's office and the state legislature have finalized budget plans for 2009 and 2010.

Compounding the situation, the market value of our endowment investments has declined significantly—as it has for almost all U.S. universities—and we are seeing indications of reduced sponsored research funding for next year.

In response to the downturn, I instituted a hiring freeze at the beginning of October for all non-academic faculty positions and asked all vice presidents to delay, reduce or forgo certain expenditures in their respective areas. More recently, I urged faculty and staff to carefully consider all expenditures and discretionary spending, regardless of funding source.

When more is known, I will communicate our longer-range plan for navigating through these difficult times. Our commitment to students will remain our top priority; efforts to maintain budget flexibility will be made so as to preserve the quality of a Mines education.

Thank you for your continued commitment and support. Now, more than ever, alumni, friends and members of our community can play a crucial role in perpetuating the strong legacy for which Mines has long been known.

Best wishes to you for 2009,

President M. W. "Bill" Scoggins



Contents

Winter 2008-09



22



28

© David Newton istockphoto

istockphoto

Features

22 Photovoltaics

It comes down to efficiency and price. Right now photovoltaic technology is simply not economical. However, scientific breakthroughs that boost efficiency or lower production costs could help tip the balance.

28 Writing

It's an essential skill for professional engineers, but it's not something most Mines students have a great deal of interest in learning. Thankfully, it's now thoroughly integrated into the Mines curriculum.

Departments

- 4 Inbox
- 5 Letter to Our Readers
- 6 Inside Mines
- 10 New Frontiers
- 12 Spotlight
- 16 Just Published
- 18 Investing in Mines
- 20 Scoreboard
- 34 The Network
- 36 Fast Forward
Class Notes, Weddings,
Class of 2029, Passings
- 52 Last Word
- 53 At Your Service

Growing Compliments

My compliments to you and your staff on the content in the fall 2008 issue of *Mines*. I refer specifically to the two articles on algae and geobiology, and the focus on Ms. Major-Sosias and the work of Areva. I am very pleased that *Mines* will be focusing on these sources of energy.

I live in the Boothbay Harbor region of Maine, and we are the home of The Bigelow Laboratory for Ocean Science, which is a leader in the field of microbiological research. I am sure the Mines faculty are familiar with their work. However, I would like to give them a copy of *Mines* magazine as there may be a connection that could be made.

Also, I would like to send copies of the magazine to our two U.S. senators and local politicians to encourage them to pursue the nuclear power discussion with their colleagues.

Richard E. Palmer '61

Curriculum

The article "The Mines Curriculum" makes little mention of the professional degree as a standard degree through the 1970s, which is unfortunate. The change from the professional degree to the bachelor's degree was done primarily to compete with other schools. Perhaps the author needs to be a little less biased toward the current degree and more accurately describe the school's history. After all, older graduates take great pride in their professional degrees, which included considerably more coursework than the bachelor's degrees that came later, and were recognized by industry as a superior degree to a bachelor's granted by most other engineering schools at the time.

Ironically, the illustration on page 32 shows a skinny Bill Wilson in 1964 outweighing two current students.

The article on Marv Kay was great. He truly is Mr. Silver and Blue.

Bill Wilson '65

Editor's Note: The article to which Bill Wilson refers does mention the professional degree in the third paragraph, calling it the modern equivalent of a bachelor's degree plus a professional master's degree. However, this point is not raised again, making it easy for readers to think the story equates the professional degree curriculum with a modern bachelor's program. We regret this confusion. The story aims to discuss the evolution of bachelor's degree programs since they were introduced in the late 1960s; there was no intention to put professional degrees on a par with bachelor's degrees.

I want to congratulate you on Larry Borrowsky's "The Mines Curriculum" article. That's the first time in 50 years that it's been outlined how they have changed the curriculum.

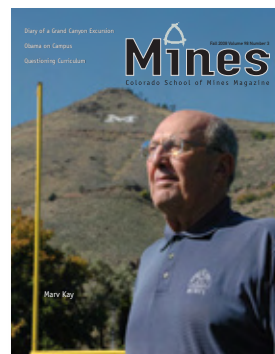
Tom McLaren '52

Marv Kay

What a thrill when I clicked on my email this evening and was greeted with a picture of Marvin Kay on the cover of *Mines* magazine. It was a real memory trigger for me.

I first met Marvin when my family moved to Ouray, CO, in the late '40s.

My father, William Klein '31, had accepted a position to work with Marvin's father at the American Lead and Zinc processing mill just north of town. The ore for the mill came from the Silverton area, and I recall some great trips in the back of an old four-wheel drive Dodge Powerwagon into the San Juan Mountains around Silverton. Marvin Sr. would drive and cut the corners really close scaring all of us in the back.



Marvin and his family lived on the northeast corner of Ouray at the top of a steep hill and adjacent

to Cascade Creek. I still have memories of a major rainstorm and flood from Cascade falls. My mother drove up the hill to check on the Kays, and she recalled seeing Marvin's mother wading out of the house in a mudflow up to her knees, carrying Mary, the youngest. We later moved into their house when the Kays moved to Grand Junction. We would often spend weekends in Grand Junction with the Kays and Marvin was always the oldest kid, so it was cool to hang around with him.

In 1961, when I graduated from Cripple Creek-Victor High School, I was fortunate enough to attend Mines. Marvin was there, and he was a welcome sight. His calm voice and hand amidst the stress and turmoil of trying to adapt to a very new, rigorous way of life was a welcome assurance that things were going to be okay.

And so thanks to *Mines* magazine. I've followed his life from a distance as I moved along in a variety of incredibly interesting assignments with the USGS. As I clicked on the computer tonight, there his picture was. It was great to see this longtime friend. Marvin, we hope you are doing well. Thanks for being there when a lonely and scared freshman needed some help.

Keep up the great publication. My dad, my youngest brother and I all graduated from Mines.

John Klein '69, MS '71

Pinpointing Summer Cover

The photo was taken looking downstream at Horseshoe Bend in Marble Canyon [in the Grand Canyon]. The overlook is only a short walk west from Highway 89A, about four miles southwest of Page, AZ.

Tim MacIntyre '06



Winter 2008-09
Volume 98 Number 4
www.mines.edu/magazine

M.W. "Bill" Scoggins
President, Colorado School of Mines

Eric M. May '99
President, CSM Alumni Association

Anita Pariseau
Executive Director
CSM Alumni Association

Nick Sutcliffe
Editor and Director of Communications
CSM Alumni Association

Editorial Board

Jim Larsen '65, Joe Mahoney '86, Anita Pariseau,
Arthur Sacks, Erica Siemers, Nick Sutcliffe,
Marsha Williams

Contributing Writers

Nicole Branan, Anne Button, Oliver Dewey, Jeff Duggan,
Karen Gilbert, Trisha Bentz Kendall, Jennie Lay,
Catherine May, Erica Siemers, Marsha Williams

Copy Editors

Jeannie Jacobson, Trisha Bentz Kendall

Art Director

Craig Korn, VeggieGraphics

Photography

Joel M. Bach, Catherine May, istockphoto,
NREL, Chris Peters

Printing

American Web
CPM Number # 40065056

Dear Readers,



There are several not-to-be missed items in this issue, the most important being the president's sobering message found inside the front cover. We will have more on this subject in the spring issue, so please stay tuned.

On a more optimistic note, don't miss stories in *Inside Mines* on the record number of applications the school has received in the last two years, the establishment of the new oil shale center and the promising partnership between Mines and Kazakhstan's leading natural resources university. Also read about the launch of the school's new website this fall, which has dramatically elevated Mines' online presence.

As the cover suggests, this issue has a distinct liberal arts vein running through its pages. The Spotlight section features Tina Gianquitto, a faculty member from the Division of Liberal Arts and International Studies, along with two former students of the liberal arts-oriented McBride Honors Program, Rachel Des Cognets and Wentz Wensel. One of the feature stories examines the importance of writing in the engineering curriculum. Both alumni profiled in the back of the magazine are professionally involved in the arts—one as a digital animator for Disney, the other as a playwright. And *Last Word* describes how two *Oredigger* newspaper editors ended up rubbing virtual shoulders with liberal arts majors from around the country when they accepted an invitation from the *New York Times* to participate in a live blog during the Presidential debates. For those looking for more technical content, the story about photovoltaic research at Mines may be of interest, as well as the *New Frontiers* story about the Colorado Renewable Energy Collaboratory's latest addition: the Center for Research and Education on Wind (CREW).

When you turn to the back of the magazine, please take a moment to read the article, "Membership Matters," outlining the 2008 alumni association budget. As you can see, *Mines* magazine is the single largest expense for the organization, and membership revenue is our most important source of income. During these challenging economic times, your membership support could be more critical than ever; so please, if you appreciate receiving this magazine, take out a membership with the alumni association. You can do this online at www.minesonline.net, or by responding to a mail or email solicitation. Thank you!

We were most encouraged by all the feedback from the fall issue. Thank you for your interest and please keep the mail coming.

Nick Sutcliffe
Editor and Director of Communications, CSMAA

Mines is published quarterly by Colorado School of Mines and the CSM Alumni Association for alumni and friends of the school. *Mines* magazine is a critical communication serving the Colorado School of Mines community. Its mission is to keep readers informed about the school, to further the goals of the school and the alumni association, and to foster connectedness.

Comments and suggestions are welcome. Contact us by writing to *Mines* magazine, P.O. Box 1410, Golden, CO 80402; or call 303.273.3294 or 800.446.9488, ext. 3294 between 8 a.m. and 5 p.m. M-F, MST; or email magazine@mines.edu.

Visit the *Mines* magazine website at
www.mines.edu/magazine

Campus News

Expanded Recruiting Boosts Applications

More students applied to Mines last year than in any previous year, suggesting that recent efforts to increase the number and diversity of applicants are paying off.

"We've seen a steady increase in the number of applicants over the past couple of years," says Bruce Goetz, director of admissions, who reports that last

year 7,200 applications were filed, 4,200 were accepted and 905 new students were enrolled for the fall 2008 semester.

"The larger the applicant pool," Goetz says, "the more selective we can be." The average high school grade-point average of this year's freshman class was 3.75.

The goal of the Admissions Office goes beyond identifying and selecting the most academically qualified students; it also seeks a balanced student body. This means picking a group of aspiring engineers strong in math and science, who have a broad set of interests, whether they're athletes, musicians, volunteers or writers. It also means the Admissions Office must do its best to balance the mostly male, mostly Coloradoan student body by targeting recruitment efforts toward women and non-resident students. Two campus organizations that admissions works with closely to recruit more women are the Society of Women Engineers and Women in Science, Engineering and Math. Reflecting positively on their efforts, the fall 2008 freshman class has the highest percentage of women yet—almost 30 percent—and one quarter of the class is from outside Colorado. The percentage of students of color has held steady at a comparatively high 14 percent.

Celine Graas, a freshman from Jericho, VT, is just the high-achieving student with external interests that Mines seeks to attract. "When I found there was no equestrian program at Mines," Graas says, "I took it upon myself to start a horse club." Graas, who initially learned about Mines from her mother, Carol Graas '89, is also a member of the Society of Women Engineers.

To capture the attention of non-resident students, admissions must work hard. "In Colorado, Mines is synonymous with quality. Part of our job is to market the school's reputation outside the state," says Goetz. Last year admissions sent recruiters to Alaska, Oklahoma and Texas; Illinois has been added to the itinerary this year.



Celine (left) and Carol '89 Graas

The admissions team also mails information to more than 100,000 students across the country, based on their test scores and interest in technical fields. Non-resident students, Goetz says, are especially attracted by the school's relatively small size, its location and the opportunities Colorado provides for outdoor recreation.

Most prospective students visit campus at least once before deciding to accept a place at Mines, and the impressions they take away are often the deciding factor. Liz Hunter, a freshman from Farmington, NM, visited the school last year, and she says it sealed the deal. "After I visited Mines, I just fell in love with the school. I didn't even consider any other schools, even the ones to which I'd already applied." Admissions coordinates about 1,600 such student visits each year and Goetz tries to meet personally with most of the students before they tour the school.

The office is clearly doing something right: 2009-10 is shaping up to be another record year for applicants. As of November 2008, the Admissions Office had received about 5,000 applications for fall—more than had been received by the same point in 2007.

For now, Goetz says, the size of incoming freshman classes must remain at roughly 900 new students per year due to capacity constraints. If this changes and the school decides to increase enrollment, the size of the applicant pool will have to grow as well. Luckily, says Goetz, "The trend has always been up. There's no indication that interest in Mines is going down."



New Web Site Launched

Mines launched an entirely redesigned web site in October, incorporating a bold new look, simpler navigation and improved search capabilities. The new site is a complete makeover of the school's online presence. "Our goal was to develop a compelling site that would effectively tell our story to external audiences," said Marsha Williams, director of integrated marketing communications. "Navigation had to be easy, and for the site to be useful and timely, it also had to be manageable. I believe we succeeded," she added.

Prior to the launch of the new site, Mines' web presence had developed organically. Most departments, programs and offices designed their own sites and posted information independently, maintaining links to a handful of central pages. With time it became increasingly evident that a coordinated approach was required, and growth was making the task increasingly large and complex. It was in early 2007 that Williams was given a mandate and a budget to spearhead the initiative.

Now, with the external site complete, another task remains: "The last part of this project entails creating a new look for the internal site catering to the Mines community," said Gina Boice, who joined Mines in 2007 as assistant director of web development. From a revised location, the old Mines site continues to serve the Mines campus community, but hopefully not for long. "The new site is going to involve some standard templates and a content management system," Boice said, adding that it should become available in early 2009.

By allowing faculty and staff from departments and offices across campus to independently manage their respective sites within a uniform framework, the content management system should make site maintenance relatively easy. And with uniform templates, it should also be simple for the community to navigate. "Once again, we want to streamline, making these pages effective communication tools for the community," said Williams.

Portraits of Mines Founder Return to Campus

Descendants of Colorado School of Mines founder Bishop George Maxwell Randall came to campus in September to hand-deliver two fragile family heirlooms to Arthur Lakes Library's Russell L. and Lyn Wood Mining History Archive. The bishop's great-great granddaughters, Marion Norman and Sandra Coleman (first cousins), gave the school a family photograph taken in the late 19th century, which includes three generations of Randalls, as well as the original charcoal sketch of a widely reproduced portrait of the bishop.

Marion and Sandra, along with their husbands, Dave and Michael, were welcomed to campus by Joanne V. Lerud-Heck, director of the library. Following a tour of Arthur Lakes Library and the Wood Mining History Archive, they met with President Scoggins and spoke of their family's deep affection for Colorado School of Mines.



Mines Unveils New Oil Shale Center

In October, Mines announced the creation of the Center for Oil Shale Technology and Research, to be sponsored jointly by Total Exploration and Production, Shell Exploration and Production, and ExxonMobil Upstream Research Company.

There are roughly 3 trillion barrels of recoverable oil lying dormant within the world's known oil shale deposits, estimates Jerry Boak, director of COSTAR, who points out that the quantity of oil that has been extracted globally since it was first discovered in Pennsylvania in 1859 is about one-third that amount. "It's a huge, huge resource," he says.

With broad expertise in energy and fossil fuels, and proximity to the largest-known deposit of oil shale, Mines has become the world's leading oil shale research institution. "We are the natural location for such a center," says Boak,



who believes there is a renaissance in evaluation of the resource, and new technology which might lead to new estimates of how much is available.

The three COSTAR sponsors are among the largest companies looking into large-scale development of oil shale. By gaining a better understanding of how oil shale was formed and what might happen underground as it is produced, the potential of the resource will become clearer. Boak anticipates that COSTAR's findings will attract new partners to the group, which in turn will propel broader research.

"We believe we can provide independent research results to help develop this resource efficiently and in an environmentally responsible manner," says Boak. He also believes their work, and the training opportunities they will provide, could prove valuable for the development of other unconventional hydrocarbon resources such as heavy oil and oil sands.

At present, the plans are for COSTAR to tackle three areas of research. The first is to develop a better understanding of what happens to oil shale when it is heated—a critical step in extracting natural gas or liquid hydrocarbons from the rock. The second is to shed light on the depositional history of oil shale in ancient, fresh and salty lakes, and how that history controls the hydrocarbon distribution. And lastly, COSTAR will seek to develop practical tools for determining the geochemistry and energy content of oil shale, devising a set of standard measures for describing available reserves.

While some findings will remain proprietary, COSTAR will compile a database of oil shale information and make it available globally via the internet. In part, this work will draw on the extensive Tell Ertl collection of oil shale research material in Mines' Arthur Lakes Library.

Physics Department Promotes Nuclear Engineering Program

The Nuclear Engineering Program is finding ways to cultivate interest among students, now that it is ready to ramp up its enrollment. As part of this initiative, the Physics Department invited author and former anti-nuclear activist Gwyneth Cravens to deliver a lecture on campus in October entitled, "Why Going Green Means Going Nuclear." Held in the Green Center, the lecture was part of the Physics Colloquium series and was attended by students, faculty and alumni.

This particular event focused on raising awareness of the environmental issues and communicating the potential of nuclear power. Cravens is not a physicist, however, her non-technical approach to the subject was effective: "Any undergraduate student could come in and understand her arguments," said Jim McNeil, professor of physics and chair of the Physics Colloquium committee, adding, "The talk was well attended and there was a lot of interest. Students kept her there for another half hour after the talk was over."

A respected author and regular contributor to *The New York Times*, *Harper's* and *The New Yorker*, Cravens has five novels to her name. Her latest book, *Power To Save The World: The Truth About Nuclear Energy*, is her first serious foray into the realm of science. Cravens explained that she decided to write the book after physicist Richard "Rip" Anderson convinced her—after numerous visits to uranium mines, experimental reactors, power plants and nuclear waste sites—of the safety of nuclear power.

"When I began my research eight years ago, I'd assumed that we had many choices in the way we made electricity. But we don't. Nuclear power is the only large-scale, environmentally benign, time-tested technology currently available to provide clean electricity," writes Cravens. In addition to the minimal carbon emissions of nuclear power, her lecture pointed to the industry's long safety record, the small quantity of waste compared to coal, and the fact that traditional coal power plants disperse much larger quantities of radiation into the environment.



© Hazran Abdul Hakim/istockphoto

Almaty, Kazakhstan

Partnership with Kazakh National Technical University

Colorado School of Mines recently entered into an agreement with Kazakh National Technical University located in Almaty, Kazakhstan. Internationally respected for its expertise in geology, mining, metallurgy, and oil and gas, the university is an interesting match for Mines.

Located at the base of a high mountain range, Kazakh National Technical University was primarily founded to support the nation's natural resource industries. The ninth largest country in the world, Kazakhstan's mineral wealth is considerable, with large natural deposits of petroleum, natural gas, uranium, lead, zinc, copper, coal, iron and gold, to name a few.

The agreement, facilitated through Chevron Corporation's University Partnership Program, outlines avenues for cooperation and a standard exchange agreement between the two universities for students and faculty. The agreement was signed by Mines President M.W. "Bill" Scoggins and Kazakhstan National Technical University Rector Adilov Zheksenbek Makeyevich.

"In today's interconnected world, Mines is pleased to develop exchange agreements with top-tier international universities such as Kazakhstan National Technical University," Scoggins said. "Both universities benefit from the exchange of faculty and students, as well as fostering collaborative research. We appreciate Chevron's University Partnership Program that makes such a relationship possible and meaningful," he added.

In Brief...

Brajendra Mishra, professor of metallurgical and materials engineering, was awarded the highest award of Honorary Membership by the Indian Institute of Metals in November. The award recognizes distinguished contributions in education, research and professional services in metallurgical engineering.

The Mines chapter of the **Society of Women Engineers** was presented with the 2008 Outstanding Collegiate Section Award at the national conference held in Baltimore in November.

Carl Mitcham, professor of liberal arts and international studies, was recently appointed by the European Commission, Research Directorate, to an expert group on the global governance of science. The group consists of nine members: five from the EU and one each from China, Norway, South Africa and the United States. The group is tasked with producing a report by the end of the year and then organizing a dissemination conference in Brussels.

Stephen Liu, professor of metallurgical and materials engineering, has been selected for the 2008 American Welding Society Comfort A. Adams Lecture Award. His lecture "Welding in the Deep Oceans: Conquest of the Other Frontier!" was delivered Oct. 6 at the opening ceremony of the 2008 AWS convention in Las Vegas, NV.

Will Vaughan, the school's new director of technology transfer, comes to Mines with seven years of experience in the Office of Technology Licensing at Ohio State University, and three years at the Governor's Office of Science and Technology in Columbus, OH.

Wind Research Center to Launch

Wind energy is the fastest-growing energy source in the world. Worldwide investments of \$18 billion recorded in 2006 are expected to expand threefold to \$60 billion by 2016. Although wind currently provides less than one percent of electrical power in the U.S., generation capability is plentiful and 20 percent could be supplied by wind without making any major changes to the grid.

Modern wind turbine technology is both sophisticated and effective; the most powerful wind turbines peak at about 6,000 kW, sufficient for about 3,750 average U.S. households. Nevertheless, wind power producers experience their share of headaches. Sitting high atop a steel tower in exposed locations, these self-contained units must deliver power under a wide range of operating conditions. Rain, snow, hail, temperature ranges of over 100 degrees, not to mention constantly shifting winds that in some locations exceed 100 mph, all combine to make turbine design a complex engineering challenge. Not surprisingly, the industry still has plenty of problems to solve.

To support scientific and engineering research into wind power, the Colorado Renewable Energy Collaboratory will launch a new research center in spring 2009. The Collaboratory, a partnership between Mines, the National Renewable Energy Laboratory, CU-Boulder and Colorado State University, has already launched two such research centers: the Colorado Center for Biofuels and Biorefining (C2B2), and the Center for Revolutionary Solar Photoconversion (CRSP). The third research arm, the Center for Research and Education in Wind (CREW), establishes a special partnership with two additional Front Range research institutions: the National Center for Atmospheric Research and the National Oceanic and Atmospheric Administration. "Understanding where wind blows, how often it blows, and how it is likely to arrive at a given site are all important factors in optimizing the design of wind turbines," says Katie Johnson, assistant professor of engineering and CREW's site director for Mines.

After conversations with representatives from the wind industry, CREW's Project Management Team identified five thrust areas for research: turbine modeling, electrical systems, turbine testing and certification, atmospheric sciences and control of wind energy systems. The list isn't exhaustive and isn't intended to limit the scope of CREW's work. "There are many other capabilities; these are just the five primary ones identified in consultation with the wind industry," said David Hiller, the Collaboratory's executive director.



Katie Johnson, assistant professor of engineering, collaborates closely with NREL researchers.

Lee Jay Fingerh/NREL

While experimental turbines remain critical for research, computational models allow researchers to test new ideas in a virtual reality for a fraction of the cost. In the course of their research, CREW scientists have developed a wide array of models to analyze phenomena such as aerodynamics, acoustics, load prediction, electrical systems, performance of mechanical components, grid interactions, wind farm effects on airflow and hydrodynamics for offshore wind turbines.

CREW's research into electrical systems includes three main areas: the conversion of wind into electrical current, delivering power onto the grid and overarching grid design. One of the key problems wind operators face is uploading power that surges with each gust of wind onto an electrical grid that operates at a constant 60 hertz. To tackle this problem, CREW scientists may consider adaptations to electrical generation systems in the turbine, improving the design of transformers and other solutions.

Turbine testing and certification will be offered by CREW through specialized facilities at NREL. Here blades can be examined for fatigue and strength, a wide range of tests for drive trains and generators are available, and turbines can be set up and field-tested for power quality and acoustics.

CREW's atmospheric science capabilities, supported by NCAR

and NOAA, include environmental sensing and measurement technologies that feed real-time data into regional forecasting models. With accurate wind prediction, operators can give utility companies advanced notice of how much power they can supply to the grid, allowing modifications to be made to the rest of the power generation mix. Accurate climate data is also important for determining wind turbine specifications; knowledge of the maximum strength of the wind in a given location is necessary to determine how strong a turbine situated there must be.

That said, designing a turbine to withstand the most extreme conditions expected in a given location based on material strength alone is costly, and, according to Johnson, not necessary. Johnson works on control systems, CREW's fifth focus area, which enable turbines to adjust to a wide range of conditions. Turbine control systems will, for example, feather turbine blades to reduce wind loads under extreme conditions. Equipped with active control systems, the tower and blades don't have to be as sturdy and turbines are less costly to produce. These same control systems also increase power generation by optimizing blade angle and torque with changing wind conditions, as demonstrated in a recent field study Johnson conducted with colleagues

from CU Boulder. "The results of our testing surprised even us," says Johnson. "We expected maybe a one or two percent efficiency increase. We had no idea it would jump by five percent."

In addition to her work on individual turbine control systems, Johnson is also working on coordinated wind farm controls. The performance of an individual turbine on a wind farm is influenced by its location relative to wind direction and the other turbines: one day it may have unobstructed exposure to the wind, while the next it might be three or four rows back. Rather than incorporate isolated control systems in such cases, a coordinated control system that governs the entire facility is likely to harness greater efficiencies.

CREW will begin supporting these critical areas of research once an operating agreement is in place—Hiller anticipates this will be complete by spring 2009. They already have commitments from Vestas, Siemens and RES Americas, and the center is now targeting small and mid-sized companies to achieve a representative cross-section of the industry. The next step will bring founding partners and CREW scientists together to formulate a set of shared research projects, to be funded by private partners' membership fees matched dollar for dollar by the state of Colorado.



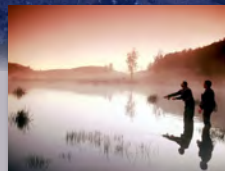
WHITING OIL AND GAS CORPORATION

1700 Broadway, Suite 2300
Denver, CO 80290

303.837.1661
www.whiting.com

CAREER OPPORTUNITIES

LIVE, WORK AND PLAY IN COLORADO!



Whiting Petroleum Corporation, a Delaware corporation, is an independent oil and gas company that acquires, exploits, develops and explores for crude oil, natural gas and natural gas liquids primarily in the Permian Basin, Rocky Mountain, Mid-Continent, Gulf Coast and Michigan regions of the United States. The Company trades publicly under the symbol WLL on the New York Stock Exchange.

Whiting's operational strategy is to "acquire, exploit and explore." Since becoming a public company in November of 2003, we have built a quality asset base through strategic acquisitions. During that period, we acquired 208.4 MMBOE of proved reserves for \$1.475 billion, or an acquisition cost of \$7.08 per BOE. Approximately 47% of these reserves were undeveloped reserves.

Visit our website at: www.whiting.com

Submit resumes to: hr@whiting.com

FACULTY

Tina Gianquitto

Research: **Science,
Environment and Culture**

Tina Gianquitto recalls as a small girl walking hand in hand with her grandfather in his vast garden.

"We'd roam around and he'd point things out and teach me about nature," said Gianquitto, associate professor of literature in the Division of Liberal Arts and International Studies. For Gianquitto, these early memories mark the beginning of her deep-seated interest in the natural world. "I've always loved nature and being outside; the freedom of it all fulfills me somehow," said Gianquitto, who spent eight days last summer kayaking with her husband off the coast of New England.

In addition to turning to nature for recreation, Gianquitto has made it the center of her academic life. Back in the mid-1990s while studying for her PhD in American literature at Columbia University, she discovered that very little research had been done on women's interaction with nature in the 19th century. She'd been contemplating a number of topics for her thesis, but this one ignited her interest like no other, and she took it up with zeal. Botany, it turned out, was one way women found to connect to the natural world, and her dissertation focused on the work of four female botanists whose scientific pursuits were far outside the norm in 19th century America.

With doctorate in hand, her subsequent research picked up some loose ends that interested her. Of the four women she'd studied, Mary Treat was the most serious and successful scientist, and she'd enjoyed a regular correspondence with Charles Darwin. Gianquitto was fascinated by these letters, in particular by Darwin's responses. And as she read more of Darwin's correspondences with women, she began to find some common threads. While American society was slow to take Darwin's theory of evolution seriously, his ideas found support among several groups of women activists, particularly those fighting for animal rights and women's suffrage. Gianquitto explains that the theory of evolution undermined prevailing ideas about women's place in society and gave women an opportunity to redefine their roles. Having spent much of last summer in England reading through boxes of handwritten correspondences from and to Darwin, Gianquitto is now working on a book tentatively titled, *Dear Mr. Darwin: Women, Evolution, and Radical Social Reform*, in which she hopes to explore the subject further.



Although her studies have focused primarily on women, Gianquitto says she's really trying to address some of the more fundamental questions that cut across gender lines. *Origin of Species* changed key tenets of Western society, she explains, and it wrought a profound change in how we view ourselves. Furthermore, she believes that science continues to revise our understanding of our place in, and impact on, the earth. She's interested in how these changes in perception change who we are and how we live. "[I'm asking] what our relationship is to the natural world and how these sciences, ones that tell us about our place in nature, influence how we see our place in the social or cultural world," says Gianquitto.

As a literary scholar who had made science and society the focus of her work, Gianquitto was a natural pick for the school, but why did Gianquitto choose Mines? "Mines appealed to me [because many of my students] are going to be dealing directly with the environment, so I thought that if I could contribute at all to their understanding of that world in which they'll be operating, then that's what I should be doing," she said. "It was a golden opportunity to work with this group of students. They are great. I really enjoy teaching at Mines."

Gianquitto says that in her literature classes her goal is to help students "develop confidence in their ability to examine the world and clearly communicate" what they learn. "I want them to look at why we use our environment in the ways we do and the consequences of that use," she said.

Stacie LaRocque, a business and economics major who took several of Gianquitto's classes before graduating last May, said she liked Gianquitto's open-ended teaching style. "She'd throw out all these ideas and lots of questions and then let you go with them," LaRocque said. "She let you think through things on your own. She made me a better student and person."



Explore the possibilities.

FORTUNE 100 Best Companies to Work for®

Devon is one of the world's leading independent energy producers with operations that span the globe. We are the highest ranked oil and gas company on Fortune magazine's "100 Best Companies to Work for®." We have a workplace culture that sets us apart from most companies, and integrity is at the core of everything we do. Explore *your* opportunities.

devonenergy.com

FORTUNE
100 BEST
COMPANIES
TO WORK FOR 2008



Commitment Runs Deep

STUDENTS

Wentz Wensel

Year: **Graduate Student**Major: **Geotechnical Engineering**

Rachel Des Cognets

Year: **Graduated Dec. '08**Major: **Engineering, Civil Specialty**

Wentz Wensel and Rachel Des Cognets traveled to Washington, D.C. last summer to serve as interns for the U.S. House Committee on Natural Resources for the Republican Desk. Both enrolled in the McBride Honors Program, they were considering careers in public policy and wanted to take a closer look. What they saw helped them make up their minds, but their decisions were polar opposites.

As part of the U.S. Public Policy class, McBride students learn how some legislation governing technical issues has been written into law without sufficient involvement from engineers. Such laws can impose costly and ineffective requirements on an entire industry despite the availability of more effective alternatives. Such incidences are less likely to take place if more engineers and scientists are involved in the formation of public policy and legislation, and this was the role Rachel and Wentz went to Washington to consider.

For Rachel, it began when she read *Dance of Legislation* by Eric Redman. The book goes behind the scenes on Capitol Hill, detailing the passage of a bill through the legislative process, complete with complex plots, sub-plots and political maneuvers. "It just killed me," said Rachel. "I knew I had to go; I had to do this. It sounded exciting and so useful for an engineer to be in that environment."

Rachel was exhilarated by her time in D.C. "Every day was so exciting ... I still really want to do this," she said. "I'll graduate in December with an undergraduate degree in civil engineering and I've applied to the University of Denver's international studies program. I'm hoping to work some day in international policy with water resources."

Wentz came to some quite different conclusions. "I thought it was something that I really wanted to do," he explained. "It was an amazing experience, but I learned that I don't really want to work in Washington. Maybe sometime later in life, if I see something really wrong that I think I can fix, I'll maybe get into politics, but it will never be a career for me." Explaining why, he reflects, "You always have to be on your toes; always have to have a smile on your face, no matter how you feel; always have to be engaging and make a good impression. You never know who is around you."

Although the political infighting was wearing at times, it was



also stimulating. "It was really fun being on the minority side because you just had to fight harder," said Rachel. She described how Democratic and Republican staffers would be gathered in a back room watching a hearing via closed-circuit TVs, cheering and giving each other high-fives when their respective bosses successfully "slammed" another senator. This,

even though "the other senator's staffers were just four seats over," said Wentz.

Though the rivalry was sometimes harsh, Wentz and Rachel frequently experienced a sense of collegiality among staffers, regardless of political affiliation. "It's quite hard to get a straight answer out of a representative or a senator," said Wentz, "but the staff will give you surprisingly direct answers. They'll say, 'this is do-not-repeat, but ...'"

For the six weeks they spent in Washington, Wentz and Rachel were insiders to a world viewed by most from a distance. Becoming a part of that world was exciting in and of itself. They laughed about discovering some of the dos and don'ts—how none of the interns wear their intern badges issued for the Capitol Building "because it makes interns look too much like interns." And they describe rushing presentations through the Capitol to the Senate Floor using a shortcut through a labyrinth of dimly lit passageways.

It was a formative time that they will always remember and they are both very grateful to the McBride Honors Program for the experience; they are also grateful for the contribution it has made to their overall undergraduate experience. "I have learned way more than I would have in any other program, probably at any other school, because it's based off an engineering background," says Wentz, who has completed his bachelor's degree and is now a graduate student studying geotechnical engineering. "You get to see the whole picture. You can be a great engineer with just the math and science, but you are much more effective if you understand the wider landscape, like how many people are influenced by what you do, who reads that report you wrote, and how it will be used to make decisions. The politics are important."

Since the McBride Honors Program has given her a clear direction for her career that she's excited about pursuing, it's not surprising that Rachel is equally upbeat. And she puts an interesting twist on their respective decisions: "For me, instead of using public policy for engineering, I'm going to use engineering to be a better policy maker."

conscientious

sometimes what you don't see
makes all the difference in the world



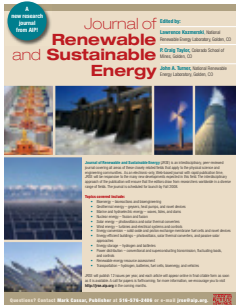
At EnCana, we are committed to being responsible. For our customers, our communities and each other. That's why we set benchmark practices for safety and give our employees lifestyle benefits that support their family's future. At EnCana, we passionately believe in being the best. Whether we're providing energy to customers or a dynamic work environment for our employees, we always deliver in a way that surpasses expectations. If you're ready to join a company that delivers on its commitments—and its responsibilities—then discover the EnCana Experience.

We are currently hiring Engineers and Geoscience professionals who are recent grads or alumni with over 7 years of experience from the Colorado School of Mines.

Experience EnCana for yourself
at encana.com/careers.

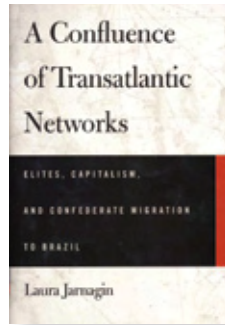
EnCana is an equal opportunity employer.

ENCANA[™]
energy for people



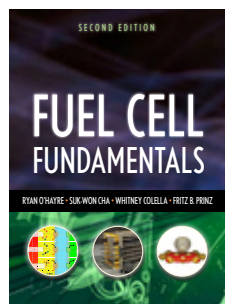
Journal of Renewable and Sustainable Energy

Craig Taylor, Mines physics professor and associate director of the Colorado Energy Research Institute, is co-editor of the recently launched *Journal of Renewable and Sustainable Energy*. Published by the American Institute of Physics, the online-only journal is an interdisciplinary, peer-reviewed journal covering physical science and engineering related to renewable and sustainable energy. As an electronic-only, web-based publication, the journal can be responsive to the rapid developments expected in this field. The interdisciplinary approach of the publication will ensure that the editors draw from researchers worldwide in a diverse range of fields. Topics to be covered include bioengineering—bioreactions and bioengineering; geothermal energy—geysers, heat pumps and novel devices; marine and hydroelectric energy—waves, tides and dams; nuclear energy—fission and fusion; solar energy—photovoltaics and solar thermal converters; wind energy—turbines and electrical systems and controls; energy conversion—solid oxide and proton exchange membrane fuel cells and novel devices; energy-efficient buildings; energy storage; power distribution—conventional and superconducting transmission, fluctuating loads and controls; renewable energy resource assessment; and transportation. The journal is published monthly, although each article will appear online in final citable form as soon as it is available. (<http://jrse.aip.org>)



A Confluence of Transatlantic Networks: Elites, Capitalism, and Confederate Migration to Brazil

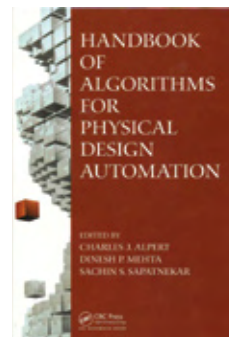
Publishing under the pen name Laura Jarnagin, Laura J. Pang, associate professor of liberal arts and international studies, has published *A Confluence of Transatlantic Networks*, a study in world history demonstrating how capitalism can be understood by examining the features of its underlying social networks. The book reconstructs social networks whose evolution converged in the 19th century to facilitate postbellum Confederate migration to Brazil. Placing that phenomenon in the context of the Atlantic world sharpens historians' understanding of such 19th century historical currents as international commerce, liberalism and Protestantism, while offering insight into an obscure migration that appears to be little more than a historical curiosity. (The University of Alabama Press, Tuscaloosa, AL, 2008)



Fuel Cell Fundamentals

Ryan O'Hayre '99, assistant professor of metallurgical and materials engineering, recently published *Fuel Cell Fundamentals*, 2nd Edition. The book gives undergraduate and beginning-level graduate students an introduction to the science and engineering behind

fuel cell technology. Emphasizing foundational scientific principles, the text provides straightforward descriptions of how fuel cells work, why they offer the potential for high efficiency and how their advantages can best be used. Designed to be accessible to beginners, the text is suitable for any engineering or science major with a basic background in calculus, physics and thermodynamics. The textbook is used in Mines' Fuel Cell Science and Technology course, one of the largest and most popular fuel cell courses in the nation. (John Wiley and Sons, Inc, 2005)

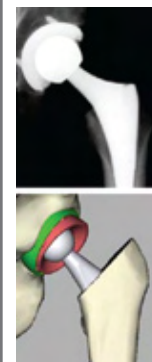


Handbook of Algorithms for Physical Design Automation

The specialized algorithms used in VLSI physical design automation software (very-large-scale design, for chip fabrication) have roots in theoretical computer science and discrete mathematics. The objectives and constraints in physical design automation are tied to the constantly evolving semiconductor fabrication technology. Dinesh Mehta, professor and department head of the Department of Mathematical and Computer Science, recently co-published *The Handbook of Algorithms for Physical Design Automation*. The text provides an overview of VLSI physical design automation, emphasizing new techniques and improvements that have emerged in the past decade.

After a brief introduction to the modern physical design problem, basic algorithmic techniques and partitioning, the book discusses floorplanning, placement, net layout, optimization, special nets and physical synthesis. (Auerbach Publications, 2008)

Computer-Assisted versus Manual Alignment in Total Hip Arthroscopy



Hip replacements have become one of the most successful and cost-effective surgical procedures in medicine. More than 250,000 patients in the U.S. undergo hip replacement surgery annually, a number

expected to quadruple over the next 20 years. While most patients enjoy excellent results, a small percentage experience postsurgical problems, including hip dislocation. Anthony Petrella, assistant professor of bioengineering, co-authored a paper entitled "Computer-Assisted versus Manual Alignment in Total Hip Arthroscopy: A Probabilistic Approach to Range of Motion," which examines the benefits of computerized surgical instruments that help a surgeon position hip implants in the body with greater accuracy. Using specialized statistical methods, their study showed that hip implants positioned with computer assistance gave patients a greater range of motion at the hip and reduced the chances of hip dislocation. Delivered at the Hip Society Meeting, 2008, the paper was published online by the Association of Bone and Joint Surgeons 2008. (<http://www.clinorthop.org>)

YOUR FUTURE IS HERE

At Colorado Springs Utilities, we focus our attention on the basics – our four core services of electricity, natural gas, water and wastewater.

For more than a century, we have been using clean, renewable sources, like Rocky Mountain water, to generate electricity and we're committed to expanding our use of green power.

We have jobs for:

- ✓ Engineers: civil, chemical, environmental, electrical, mechanical, industrial, petroleum
- ✓ Science: biology, chemistry, microbiology

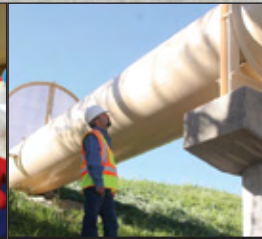
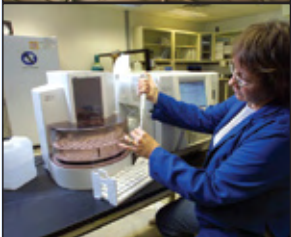
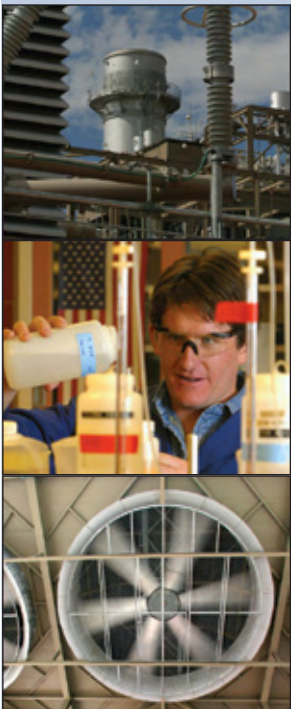
We are the proud recipients of:

2008 ENERGY STAR Partner of the Year award

2007 INROADS Business Coordinator
of the Year award

J.D. Power Award in 2005, 2006 and 2007

VISIT csu.org for
career opportunities.



Investing in Mines

An investment in knowledge always pays the best interest.

—Benjamin Franklin

Philanthropy is Center Stage at the Mines Century Society Dinner

Colorado School of Mines honored the generosity of some of its most dedicated alumni and friends at the Mines Century Society Dinner on October 4. Members of the Mines Century Society, President's Council and Heritage Society gathered for music and merriment in Lockridge Arena, where President Scoggins paid special recognition to 2007 – 2008 members of the Guggenheim Society of the President's Council, as well as the new and rising members of the Mines Century Society who are listed below.

Individuals whose lifetime giving to the school exceeds \$100,000 are honored as members of the Mines Century Society at Copper, Silver, Gold, Platinum and Diamond levels.

Platinum Level \$3,000,000 to \$4,999,999
Franklin J. and H. Darlene Stermole *

Silver Level \$500,000 to \$999,999
LaVerna K. Anderson **
Carolyn V. Mann **

Copper Level \$100,000 to \$499,999
Helen Elizabeth Swank Cook
Margaret L. Campbell and Edward H. Johnson
Ben E. Mares
William F. and Marilyn W. Oline
Neal E. and Margaret R. Schmale
Bill and Karen Scoggins
Robert G. Smith, Jr.
Andrew and Sherry Swiger
Delbert F. and Alice M. Tolen

* Previously a Gold MCS member

** Previously a Copper MCS member



Peters Photography



\$1 Million Gift Will Support International Students from Developing Countries



A new scholarship fund will enable more students from developing countries to earn their degrees at Mines. With a \$1 million contribution, Larry J. Buchanan '73, PhD '79 and Thomas S. Kaplan, established the Buchanan-Kaplan Scholarship Fund to provide need-based scholarship awards to non-U.S. students who are citizens of underdeveloped or developing countries. Awards will provide support to cover students' tuition, fees, books, living expenses and travel costs.

"My business partner and I established this scholarship fund at Colorado School of Mines in order to express our gratitude to the geologists and engineers whose love of science and environment has enhanced the standard of living of countless people throughout the world," Buchanan said. "It is our hope that with this gift, we will open doors for talented young people from around the globe to fulfill their dreams of attending Mines, earning their degrees and continuing the school's long history of service to our global society."

Buchanan earned his undergraduate and doctoral degrees in geology and geological engineering at Mines and is now president of Electrum, LLC, a gold exploration company. Founded by Kaplan, Electrum is now one of the largest privately held gold exploration companies in the world. Kaplan holds bachelor's, master's and doctoral degrees in history from the University of Oxford. He began his career as an advisor to hedge funds in the field of strategic forecasting, and, in 1993, founded Apex Silver Mines. In 1996, Apex Silver geologists discovered the world's largest open-pit silver deposit at Apex's San Cristobal project site in southern Bolivia, a discovery for which Buchanan received the 2006 Thayer Lindsley International Discovery Award. Both Buchanan and Kaplan have extensive international business experience, with particular expertise in the developing markets of Asia, Latin America, the Middle East and Africa.

Hess Corporation pledges \$1 million to Mines; Larry Buchanan '73, PhD '79 and Thomas Kaplan set up scholarship with \$1 million gift; Other recent gifts

Colorado School of Mines recently received eight large gifts:

Anadarko Petroleum Corporation contributed \$200,000 toward their \$1,000,000 pledge to the Marquez Hall building project and the Department of Geology and Geological Engineering.

Bequest distributions of \$319,467 received from the estate of **Laverna K. Anderson** will provide unrestricted support for the school through The Mines Fund.

Larry J. Buchanan '73, PhD '79 and **Thomas S. Kaplan** established the Buchanan-Kaplan Scholarship Fund with a gift of \$1 million to provide scholarship support for non-U.S. Mines students who are citizens of underdeveloped and developing countries.

Devon Energy Corporation contributed \$100,000 of their \$500,000 pledge to the Marquez Hall building project.

EnCana Oil & Gas (USA) Inc. contributed \$400,000 toward their \$2,000,000 pledge to the Marquez Hall building project.

Gerald '68 and Tina Grandey continued their support for programs at Mines with a \$200,000 gift in honor of Gerry's 40th reunion.

Hess Corporation committed \$1 million to the Marquez Hall building project.

A total of \$650,000 in bequest distributions was received from the estate of **Carolyn V. Mann**, widow of John F. Mann '43 and longtime friend and supporter of geology at Colorado School of Mines.

Other recent gifts of more than \$25,000 from individuals, corporations and foundations:

Aqua-Aerobics Systems, Inc. contributed \$25,000 to support the Advanced Water Technology Center (AQWATEC).

BHP Billiton contributed \$50,000 in support of physics research at Mines.

Jerome T. '64 and Rebecca Broussard made a \$50,000 contribution in continued support of the Broussard Family Engineering and Technology Management Scholarship Fund.

Margaret Campbell and her husband, **Edward Johnson**, contributed \$50,000 to the Harry D. Campbell Endowed Scholarship Fund in honor of Margaret's father Harry D. Campbell '42 on his recent birthday.

Chesapeake Energy Corporation contributed \$25,000 to the Chesapeake Energy Scholarship Fund.

ExxonMobil contributed gifts totaling \$35,000 in support of the Oil Shale Symposium and several academic departments at Mines.

Freeport-McMoRan Copper & Gold contributed \$30,000 toward student scholarships.

John '52 and Erika Lockridge made a \$50,000 gift in continued support of geology and geological engineering at Mines.

Schlumberger gave a Faculty for the Future Award of \$37,923 to a graduate student in the Materials Science Program.

St. Mary Land & Exploration Company contributed \$25,000 toward their endowed scholarship fund for petroleum engineering students, \$10,000 to the Petroleum Engineering Department, and \$1,000 to the Career Center.

The United States Steel Foundation contributed \$25,000 toward scholarships for students in the Department of Metallurgical and Materials Engineering.

Scoreboard

Athletics

Oredigger Football Sings “Dixie” Once Again

For the second consecutive season, the Colorado School of Mines football team accepted an invitation to play in the Dixie Rotary Bowl on December 6, 2008, at Hansen Stadium on the campus of Dixie State College in St. George, UT. The Orediggers squared off against Western Washington University in the 23rd Annual Dixie Rotary Bowl, which was broadcast live on the Altitude Network.

The top schools from the Rocky Mountain Athletic Conference and the Great Northwest Athletic Conference that did not qualify for the NCAA Division II playoffs received invitations to St. George. The Dixie Rotary Bowl, which began inviting NCAA Division II schools in 2006, is one of two sanctioned NCAA Division II bowl games.

“We were very excited about our opportunity to once again compete in the Dixie Rotary Bowl,” said Mines head football coach Bob Stitt, who just completed his ninth season at the school. “We were proud to represent the RMAC and truly enjoyed the opportunity to travel to St. George.” A win would have been a fitting end to a successful season, but after Mines gained a 10-0 lead early in the game, Washington came back to equalize shortly before the end of the second quarter, and then went on to score 15 unanswered points in the second half of the game.

The Orediggers went 7-2 in the RMAC and secured their seventh winning season in the past eight years. Mines’ trip to the 2008 Dixie Rotary Bowl marked the fourth time in program history that Mines has competed in a bowl game. Prior to playing in the 2007 Dixie Rotary Bowl, the Orediggers played in the Aztec Bowl in 1979 and again in 1989. The 2008 Dixie Rotary Bowl also marked the third time in five years that Mines had qualified for post-season play. Mines qualified for the NCAA Division II playoffs for the first time in program history in 2004.



David Pesek

Spring 2009 CSM Athletics Home Schedule

BASEBALL

Feb. 7	Midland Lutheran (DH)	1:00 pm	Mar. 20	Metro State	6:00 pm
Feb. 8	Midland Lutheran (DH)	11:00 am	Mar. 21	Metro State (DH)	1:00 pm
Feb. 20	Emporia State	4:00 pm	Mar. 22	Metro State	12:00 pm
Feb. 21	Emporia State (DH)	1:00 pm	Apr. 3	N.M. Highlands Univ.	6:00 pm
Feb. 22	Emporia State	11:00 am	Apr. 4	N.M. Highlands Univ. (DH)	1:00 pm
Feb. 27	Nebraska – Kearney	6:00 pm	Apr. 5	N.M. Highlands Univ.	12:00 pm
Feb. 28	Nebraska – Kearney (DH)	1:00 pm			
Mar. 1	Nebraska – Kearney	12:00 pm			
Mar. 6	Regis University	6:00 pm			
Mar. 7	Regis University (DH)	1:00 pm			
Mar. 8	Regis University	12:00 pm			
Mar. 13	CSU – Pueblo	6:00 pm			
Mar. 14	CSU – Pueblo (DH)	1:00 pm			
Mar. 15	CSU – Pueblo	12:00 pm			

SOFTBALL

Feb. 7	Emporia State (DH)	12pm / 2pm
Feb. 8	Emporia State (DH)	11am / 1pm
Feb. 28	CSU – Pueblo (DH)	12pm / 2pm
Mar. 1	CSU – Pueblo (DH)	11am / 1pm
Mar. 14	Mesa State (DH)	12pm / 2pm
Mar. 15	Mesa State (DH)	11am / 1pm

Apr. 3	N.M. Highlands (DH)	12pm / 2pm
Apr. 4	Western N.M. Univ. (DH)	2pm / 4pm
Apr. 10	Nebraska – Kearney (DH)	12pm / 2pm
Apr. 11	Nebraska – Kearney (DH)	11am / 1pm
Apr. 14	UC – Colorado Springs (DH)	2pm / 4pm
Apr. 25	Regis University (DH)	12pm / 2pm
Apr. 26	Regis University (DH)	11am / 1pm

INDOOR TRACK & FIELD

Jan. 31	Joe Davies Open	All Day
Feb. 20	CSM Twilight Open	All Day

For complete schedules, rosters, results and statistics, please visit the Colorado School of Mines Athletics web site at <http://athletics.mines.edu>.

Mines Ranked Fourth in Collegiate Power Rankings

In August 2008, Colorado School of Mines was ranked fourth in the National Collegiate Scouting Association's sixth annual NCAA Division II Power Rankings. Collegiate Power Rankings rate colleges and universities based on student-athlete graduation rates, academic strength and athletic success. Colorado School of Mines, which was the highest-ranked Rocky Mountain Athletic Conference institution, also placed 96th in the NCSA's overall collegiate rankings, which includes NCAA Division I, II and III schools.

NCSA Collegiate Power Rankings are calculated by combining *U.S. News & World Report* ranking, U.S. Sports Academy Directors' Cup ranking and NCAA student-athlete graduation rates for each college or university. The U.S. Sports Academy Directors' Cup rating evaluates the strength of NCAA athletic departments while the U.S. News & World Report rating focuses on academic excellence. The student-athlete graduation rates are based on those provided by the NCAA.



Mitchell Named RMAC's Soccer Academic Player of the Year

Mines' Kayla Mitchell was selected as the 2008 Rocky Mountain Athletic Conference Women's Soccer Academic Player

of the Year. The honor marks the second consecutive year that a student-athlete from one of the Oredigger soccer teams has garnered such recognition—Craig Thompson was named RMAC Men's Soccer Academic Player of the Year.

Mitchell was also a unanimous First Academic All-RMAC selection, a First Team All-RMAC soccer pick, and she earned All-RMAC Tournament and Daktronics First Team All-Central Region accolades. In 2007, Mitchell brought home First Team All-RMAC and First Team Academic All-RMAC honors, and in 2006 she won Second Team All-RMAC laurels.

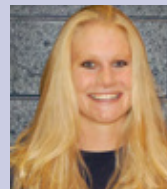
Thin Air Images/Joel Bach

Oredigger News & Notes...

- The Mines Cycling Team took second place at the NCCA Division II MTB National Championship Team Omnium in Banner Elk, NC, after being narrowly beaten by a strong Appalachian State Team. The Mines Cycling Team is currently tied for number one with Colorado College for the NCCA Division II Team Rankings. Mines looks to consolidate its hold at the upcoming NCCA Cyclocross Nationals in Kansas City, KS, on December 14.

- Five Mines soccer players earned Daktronics All-Central Region honors last fall. Jeff Nelson, Cameron Brown and Ted Decker earned recognition for the Oredigger men, while Kayla Mitchell and Corinne Johnson garnered honors for the women.

- In October 2008, Art Siemers, track and field, and cross country coach won the 17th annual Peak Performance Maine Marathon in Portland, ME, with a time of 2 hours, 28 minutes. Siemers was also selected Outstanding Athletics Department Faculty Member by both May and December 2008 graduates.



- Volleyball's Kaity Edmiston earned *ESPN The Magazine* Third Team Academic All-District honors this fall.

different by nature

Introducing the \$11 haircut
regularly \$16

and Hair Color Services starting at \$40
(with pure artist™ staff only - all services performed by licensed cosmetologists)

pure artist™ studio
at Eminently Hair Salon

457 Wadsworth Blvd. Lakewood, CO 80226
303.233.8089 www.worldclasssalons.com

GIFT CARDS AVAILABLE

introducing **aveda men pure-formance™**

The sun has always been humanity's ultimate power plant. It fueled the crops that allowed the earliest civilizations to form. It drove the winds that propelled people across oceans in search of new lands. It nourished the growth of plants and algae that, squeezed together under rock and dirt for millions of years, turned into the fossil fuels that are the lifeblood of our societies today.

For more than four billion years, the sun has blasted Earth's surface with more than 120,000 trillion watts of energy every year—enough to take care of current global power consumption many thousand times over. And yet, capturing even a tiny fraction and turning it directly into electricity or fuel has been an enormous challenge. Today, more than half a century after the invention of the silicon photovoltaic cell, solar energy contributes less than one percent to the United States energy portfolio.

However, the photovoltaic market is gaining ground. "If you look at the solar industry, it's been growing between 40 and 50 percent per year during the last decade, and as fast as 70 percent per year for the last several years," says Reuben Collins, physics professor and associate director of the Colorado School of Mines Renewable Energy Materials Research Science and Engineering Center. Collins is one of many scientists around the world who are ramping up their efforts to chip away at photovoltaic cells' two main shortcomings: high cost and low efficiency.

Searching for
Better Solar
Solutions

By Nicole Branan

Photo



voltaiics

The Dangling Rope Marina PV/hybrid power system, designed and installed by Applied Power Corporation (APC), is the largest solar energy system in the National Park Service (NPS) and it is estimated to save over \$2.3 million in fuel and maintenance costs over a 20-year period. "Not only will the solar system lower the cost of providing electricity for the Dangling Rope Marina, but the system will be clean, quiet and dependable," said Utah Office of Energy and Resource Planning Director Jeff Burks. "Moreover, it will eliminate the risk of a diesel fuel spill on Lake Powell."



Aspen Skiing Co./NREL

2.4-kW PV system manufactured by GE, installed at 11,000 foot elevation, on the roof of the Highlands Patrol HQ building at the Aspen Mountain Resort in Aspen, CO.

With prices currently between 25 and 50 cents per kilowatt hour, solar electricity is roughly five times more expensive than coal. Solar's sassy price tag is the result of two things: conventional photovoltaic cells convert only a fraction of the sunlight that hits them into electricity, and the materials they are made from are very expensive to produce. For example, more than 80 percent of the solar cells that currently keep light bulbs, laptops and TVs running are made from slices of bulk silicon that consists of either single or multiple crystals—structures in which all atoms are arranged in perfect order. Making these materials is pricey, says Craig Taylor, physics professor, director of the Colorado School of Mines Renewable Energy Materials Research Science and Engineering Center and associate director of the Colorado Energy Research Institute. "The manufacturing process involves many steps and it also wastes quite a bit of silicon."

The most efficient and widely used photovoltaic cells are made from slices of monocrystalline silicon about 300 micrometers thick. Although a depth of only about 10 micrometers of silicon is needed to create an electric current, the practicalities of slicing and engineering the material require additional depth. However, a major thrust is currently under way to make so-called thin film solar cells, which use about 90 percent less silicon. "That's one of the primary ways to take

the cost out," says Richard Ahrenkiel, research professor of metallurgical and materials engineering.

Scientists have made some headway in producing thin film photovoltaic cells, and the first devices hit rooftops a few years ago. To make the slim, miniature power plants, manufacturers deposit layers of silicon or other materials onto large surfaces, such as rolls of stainless steel, and subsequently cut them into panels. This process is cheaper than growing huge slabs of monocrystalline silicon, but it also tends to produce more imperfections, which brings down the cells' efficiency, Taylor says.

Thin film cells work just like their thicker cousins: high-energy photons, the energy carriers in light, hit the solar cell, kick electrons away from the atoms they belong to and push them over an energy barrier, called a band gap. Each dislodged electron leaves a hole behind into which another electron can fall, which in turn opens up an empty spot for yet another electron. Because cells are designed such that electrons move in one direction, this game of musical chairs ultimately results in an electrical current, with displaced electrons collected and conducted out of the cell through the negative terminal and back into the cell on the positive side. Put an electrical device into the circuit, and the current is put to work.

Imperfections or blemishes in the crystalline structure, such as a misplaced atom or a distortion in the lattice, act like

obstacles, hindering the flow of electrons; instead of making it across the band gap, they lose energy and fall back into their original position without producing current, Taylor says. In fact, keeping these charge carriers—electrons and the holes they leave behind—apart from one another long enough to siphon off an electric current is essential for all types of solar cells. This so-called carrier lifetime has to be at least a few tens of microseconds long for the cell to be useful. “All of the photovoltaic technologies critically depend on this number,” Ahrenkiel points out. The carrier lifetime in a thin film cell will depend on its structure, which is influenced by how the film was grown.

Elaborate growing processes usually produce better material, but they also drive up cost. “Anybody can make an expensive material with a long carrier lifetime,” Ahrenkiel explains. The trick is to make cheap materials with long enough carrier lifetimes to yield adequate currents. Within the Colorado Collaboratory Center for Revolutionary Solar Photoconversion, Ahrenkiel and his students have started a project to characterize thin films grown with different techniques to find out which produce good films and which don’t. Taylor, who is involved in a similar project, explains that one of the main drivers of cost is the speed of the deposition process: slower means more expensive but usually also better quality, he says. That’s why “there is a big push among a lot of the thin film companies to increase the growth rate and keep the quality of their product the same.” If companies could grow their films twice as fast, they would automatically double their production. “That would be a huge benefit to them even if the efficiency stayed exactly the same.”

Imperfections are not only made during the manufacturing process, they creep into any crystal over time. Constantly blasted by high-energy sunlight, atoms are pushed around and structural defects result. “That’s a critical problem for really all solar cells,” Taylor says. That’s why one question needs to be answered for all new materials: can they maintain their efficiency after operation for long periods of time? Taylor and his team are trying to provide answers by mimicking this process in the lab. They shine high-intensity light onto the materials constantly for several days and then use various techniques to examine whether any damage was done. Those materials that hold up best are the top candidates for photovoltaics.

But no matter the quality of the material, ultimately it is the laws of physics that dictate what is possible—and they put a firm ceiling on solar cell efficiencies. Photovoltaic cells only convert between 8 and 25 percent of solar radiation into electricity because they can use only a narrow window of the solar energy spectrum. Photons carrying just the right amount of energy needed to excite electrons over the band gap are converted into electrical current quite efficiently. But sunlight is made of a

large variety of photons: those of blue light, for example, carry more energy than those of red light. Photons without sufficient energy may impact an electron, but if it’s not kicked over the band gap it produces no current. And photons carrying enough energy to bounce two or three electrons across the gap, can only transfer their energy to one—the residue is converted to heat. This means that “you are basically throwing away a fair fraction of the energy that you absorb,” Taylor points out.

Altogether, this puts a theoretical limit of about 30 percent on efficiency. Stacking various materials—each with different band gaps—on top of each other can push that limit up by an additional 10 percent or so. This technique is often employed in photovoltaic cells used in space, but it’s “way too expensive for most terrestrial applications,” Taylor says. For a long time scientists thought that this would be as good as it could possibly get, but it has recently become clear that the weird laws of quantum mechanics ruling the nanoscale world may open a door to get around the fundamental limits.


An electron in a solar cell that is kicked into a higher energy or excited state can shake off its excess energy in a number of different ways: it can jump across an energy barrier and flow as an electrical current, but it may also give off heat or emit light. When using nanoscale materials, such as tiny dots or wires, scientists at Mines are working on ways to manipulate the ways in which excited electrons give off their energy, nudging more of them into producing current, rather than heat or light. In the world of quantum mechanics it’s even possible for one photon to kick more than one electron loose. So, by fine-tuning nanostructures, scientists may be able to “optimize the amount of energy that goes into photovoltaic conversion and minimize the energy that gets lost,” says Collins. That way, much higher efficiencies than the limit of 30 percent are theoretically possible.

However, Collins cautions that nanostructure-based photovoltaic cells are very much a “down-the-road kind of thing.” Even though “there is a lot of interest, and if it works, it’s got a great deal of promise.” Scientists have yet to figure out how to make the process work, Collins adds, although they are certainly trying. Collins, along with Taylor and Pauls Stradins at the National Renewable Energy Laboratory, have started to look at nanowires, tiny strands of silicon and other materials that have a small enough diameter to follow the bizarre rules of the nanoworld, but at the same time provide a path for the flow of a current.

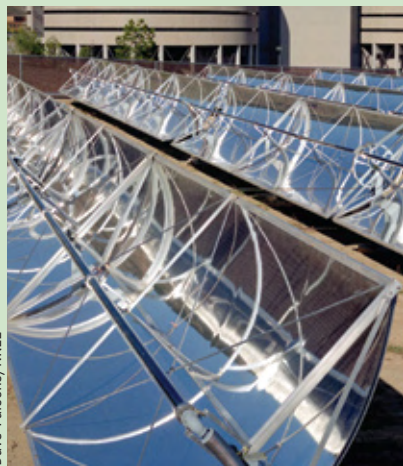
If scientists manage to boost solar cells’ efficiencies and bring down the cost of solar power dramatically, there will be another major limit to its usefulness—storage. No efficient options currently exist for storing solar power on a large scale. Even though many scientists agree that solar energy will likely become an important complement in our mix of future energy

sources, “unless we have some real breakthroughs in distribution and storage solar power is not going to be the be-all, end-all,” Ahrenkiel says.

The storage problem may be worked out in the future but for photovoltaics to become a major player in our energy portfolio “there is still a lot of work that has to be done,” Collins says. And that requires large research investments. Recent global growth in the solar industry was primarily due to government action, such as legislation requiring utilities to invest in renewable energy technology, or tax deductions to consumers who install photovoltaic cells on their homes. An alternative market mechanism under consideration is a carbon tax, which would raise the price of coal-generated electricity. But even with such a greenhouse gas penalty, the cost of conventional

photovoltaics will likely remain high compared to coal; that’s why looking into new and innovative approaches, such as nanostructure-based solar cells, is critical, Taylor says. Empirical laws that forecast future progress based on history — such as Moore’s law which predicts how much faster computer chips get each year — currently cast a gloomy outlook for photovoltaic cells, he says. Right now, photovoltaics make up about 0.01 percent of the total power mix and looking at solar cells’ analogue of Moore’s law shows that “in 2050, we might be at one percent or so.” But a breakthrough in efficiency could be a game changer because it would likely let the price of solar power plummet. And “if you get the cost to where you are competitive with coal-fired power plants, then you have a chance.” 

CONCENTRATING SOLAR POWER



Dave Parsons/NREL

Ask someone what they think the world’s largest solar power station looks like, and most people will tell you that it’s probably a huge array of shiny photovoltaic cells. But the facility located in California’s Mojave Desert has nothing to do with photovoltaics. Instead, it’s a solar thermal system, consisting of nine individual plants with a collective capacity of 354 megawatts, which have been churning out electricity since the mid-80s. The Solar Energy Generating Systems power plants provide about half a million Californians with power, and unlike photovoltaic cells, they are doing it without expensive semiconductors. Instead, the system uses mirrors to focus sunlight onto long tubes containing a synthetic oil which is used to boil water. The steam is then used to spin a turbine to produce electricity.

A few such concentrating solar power (CSP) systems are scattered across the world, but so far the technology makes up a minute part of global energy production. The main obstacle to large-scale implementation is cost. Even though CSP power is less expensive than photovoltaic electricity, it still doesn’t reach the low price of coal. “As long as there is no penalty for carbon emissions, you just can’t touch coal,” says Thomas McKinnon, professor of chemical engineering at Mines. Another issue is access to power lines, which generally don’t exist in places where CSP technologies work best: deserts. Unlike photovoltaic cells, CSP systems must have direct sunlight, because the light needs to be focused. Even a thin cloud layer can interfere with the process. “For example, a state like Florida has a lot of sunlight, but they also have a lot of high diffuse clouds; that reduces the efficiency of CSP.” That pretty much limits the places in the United States where CSP could be successful to the Southwest, but that’s actually all that would be needed. “There is more than enough to power the entire country with just what’s in the Desert Southwest,” McKinnon says.

Because CSP is generating hot fluids, it also allows for some fairly easy storage options. For example, it is possible to heat molten salt when the sun is shining and store it in insulated tanks. When electricity is needed, the hot salt is used to heat water to drive the steam turbine generators. In addition to that, CSP technology is already developed. “That means you could deploy hundreds of megawatts of CSP fairly fast,” McKinnon says. And it looks like that might be beginning to happen. For example, Xcel Energy plans to build a 200-megawatt CSP plant in Colorado by 2015, and the Israeli company Solel Solar Systems intends to have its new Mojave Solar Park—a more than 553-megawatt facility—up and running in the Mojave Desert by 2011.

“At Mines, we are learning how to make the world a better place. Even though we’re not finished with our education, we’re already thinking about solutions for the future.”

AARON ACKERMAN, Class of 2011
Engineering Physics

To learn more about Aaron and how the Colorado School of Mines Foundation supports students, faculty and educational excellence, please visit <http://giving.mines.edu>.



COLORADO SCHOOL OF MINES
FOUNDATION

Funding the present and securing the future of Colorado School of Mines

The Skill Many Engineers Wish They Didn't Need

Writing

By Larry Borrowsky



Weeks before the space shuttle Challenger launch of January 28, 1986, two engineers from aerospace contractor Morton Thiokol concluded that an O-ring on the shuttle's solid rocket boosters was susceptible to failure. The engineers provided their test data to their supervisors at Morton Thiokol and to NASA officials, all of whom disregarded the report. • The incident has become perhaps the most heavily studied engineering failure of all time. The federal government immediately launched an investigation, and the ensuing report contained thousands of pages of data, testimony and analysis. Hundreds of books and articles have since been written about the Challenger disaster, focusing on everything from faulty engineering, to lax oversight, to organizational dysfunction at NASA. But very few of those inquiries have focused on a plain and simple fact: the disaster was the result of a failure to communicate effectively. • Dorothy Winsor, an English professor at Iowa State University and a respected analyst of technical communications, contends that the Morton Thiokol engineers didn't effectively communicate the test results that predicted the O-ring failure. "They apparently believed that if they simply sent the data to their managers, the managers would automatically be convinced by it," she writes. "The meaning of the data required interpretation. The existence of data alone was insufficient to create knowledge." • This type of blind spot still exists in engineering, but it's getting smaller, not only in industry, but also in engineering education. Colorado School of Mines has been at the forefront of a growing trend to incorporate communications training into engineering curricula. Although many undergraduates arrive on campus with the expectation (and hope) that their courses won't require much in the way of writing, they quickly learn that they can't earn a Mines degree without gaining some facility with the machinery of language.



Today's Mines undergraduates get writing instruction from the moment they arrive.

"Writing is not my strongest skill," says recent graduate Andrea Ham '08, "nor is it what I wanted to do in any of my classes. But despite my grumbling, I'm thankful for all the practice I got in the various forms of writing that I will need ... as a professional."

"Many of our graduates will be moving into management within a few years," adds Jon Leydens, writing program administrator at Mines. "When they do, the skill set they need will shift dramatically. They'll need skills that they may not recognize as part of their engineering tool kit."

Students need communication skills in the workplace and engineering institutions need them in their curricula. "An ability to communicate effectively" is one of the 11 requirements listed in ABET's Criterion 3, which enumerates desired outcomes for graduating students.

U.S. engineering schools have been understandably hesitant to embrace this trend. The volume of technical and scientific material that must be packed into a four-year undergraduate program continues to grow, and there's precious little time left over. But Mines has used creative approaches to win faculty buy-in and develop a robust writing program that is tightly integrated with core engineering curricula.

"At Mines, we learn that engineering is the bridge between the scientific community and the 'everyday' world," says Zach Aman, a junior studying chemical engineering and the former editor of *The*

Oredigger newspaper. "Effective communication is as essential as superior technical ability if we are to truly succeed."

That may not have always been the message at Mines. Matt Moore '96 says when he attended Mines in the mid-1990s, "writing was out of sight, out of mind. We didn't get any education on it. And that was okay until I got into the work force. That's where I learned that communicating clearly and efficiently is a tremendous tool. Without it, we end up selling our intelligence short."

"Our final product is typically a written report," adds Lauren Evans '82, president of a Lakewood-based consulting firm called Pinyon Environmental Engineering Resources. "A lot of times the work is for a client who's not a technical person, such as a banker or a real estate developer, so we have to be able to communicate our findings and recommendations to them in a way they can understand."

Moreover, she says, the report has to be persuasive. It's not enough simply to present data clearly; that data must also be placed into context and shaped into an argument. In other words, rhetorical skills are important for the engineer.

While the term "rhetoric" can be used correctly to describe "overly elaborate, pretentious and insincere speech," its primary meaning is much more positive, referring to "the art of using language effectively and persuasively." Winsor's charge against the Morton Thiokol engineers is that their report lacked an effective rhetorical component: "People needed to persuade one another of the meaning of the data they had, but they failed to do so, partly because they did not seem to know such persuasion was necessary."

The need to overhaul writing instruction at Mines began to surface in the early 1990s. "In conversations with employers of Mines graduates," says Leydens, "faculty and administrators were hearing again and again that Mines did a fantastic job of preparing graduates who were technically excellent, superior to peer institutions, but we were lacking in the area of communications, especially writing. Then the 1994 alumni survey came in, and it too indicated that our quality was high for technical education, but not for professional skills such as writing."

In 1998 Leydens was appointed to the newly formed Writing Across the Curriculum committee, a group of about half a dozen faculty charged with bolstering the writing curriculum at Mines. The committee asked each academic department to name a designated

You don't have to be big
to think big.

Expand your career with Southwestern Energy Company.

With our rapidly growing activity in the Fayetteville Shale and other exciting ventures on the horizon, we have many opportunities in a wide range of professional positions. So if you're looking for a company that offers great salaries and benefits, with room to grow your career, you'll find it here.

Visit us at www.swn.com to view our current openings.



**Southwestern Energy
Company**

NYSE: SWN

Right People doing the Right Things.



www.swn.com | NYSE:SWN



Engineers in the professional world

face a diverse audience and will end up writing for a wide variety of purposes.

WAC liaison, and it used those channels to gather input from across campus and build consensus around key program features.

One major decision made early on concerned whether to segregate communications instruction from the rest of the curriculum by, for instance, requiring a sequence of composition courses, or alternatively, to integrate it within existing coursework. The committee, and most liaisons, argued for the latter, so that students would come to regard writing and communicating as *engineering* tasks.

“If you outsource writing instruction to a division of liberal arts, you send the message that it’s not that important for engineers and scientists,” says Leydens. “But if engineering and science faculty incorporate it into their assignments, the students write texts that directly relate to their field. For example, geological engineers might write the type of report that a geological consultant would write, giving students the message that effective writing is a vital professional skill.”


Today’s Mines undergraduates get writing instruction from the moment they arrive. During their first two years, they take three required courses that carry significant writing loads: Engineering Design I and II, and Nature and Human Values. In addition to upper-division requirements in the liberal arts, students in their junior and senior years must take another 12 credits in their major that are designated as “writing-intensive” in the Undergraduate Bulletin.

This approach carries a major challenge. It requires engineering and scientific faculty to teach writing in their own courses and many

were initially apprehensive about that prospect, even while they recognized the importance of teaching communications. To address those concerns, WAC instituted annual faculty workshops and ongoing consultations focused on incorporating writing into technical courses. Since 1998 more than 70 faculty members have attended these workshops, and more than 40 have received WAC consultations—significant numbers on a campus with around 200 full-time faculty.

Kevin Moore, an engineering professor who took the WAC workshop, is in a good position to comment on the content. In his previous post at Utah State University, he administered a portion of their Senior Design class, into which he incorporated a novel and very successful writing program. His overall impression of the WAC workshop was positive, particularly the emphasis placed on writing for a variety of different purposes. He pointed out that academic faculty tend to be most familiar with writing for academic journals that are read by a narrow audience and generally have a similar purpose. On the other hand, engineers in the professional world face a diverse audience and will end up writing for a wide variety of purposes. “As faculty, we need to make sure our writing assignments are a good match for the content of the course and for the needs of our students.”

Leydens believes the strength of the WAC model ultimately rests in its high degree of faculty involvement and commitment. Some programs try to mandate; we try to enable, so that faculty can teach writing in the way that best serves their needs and supports their overall educational objectives.”

Some Mines students may always chafe at writing and communication assignments. But most undergrads become less hostile once they gain a little exposure and improve their abilities. And without question, they recognize that good writing skills will help them professionally. “I think my written skills have improved enough so that peers and superiors will take me seriously and will be able to focus on the content of my writing instead of the writing itself,” says Ham. “I was often irritated about being forced to write,” she adds, “but I’m grateful to Mines for forcing me to do it.” 

People are proud to work for EVRAZ Rocky Mountain Steel.



We are looking for top performing engineering graduates who have a willingness to take on challenging assignments at our Pueblo, Colorado, facility.



At EVRAZ Rocky Mountain Steel we combine entrepreneurial spirit and teamwork to make a difference.

We are part of the EVRAZ INC. NA, a world-wide integrated steel and mining company. Our people set high expectations for themselves. They are committed to excellence, teamwork, quality and the highest customer satisfaction.



EVRAZ Rocky Mountain Steel
Human Resources Department
2100 S. Freeway, Pueblo, CO 81004 719-561-6274
www.EvrazIncNA.com schwetr@rmsm.com

The Network

Membership Matters

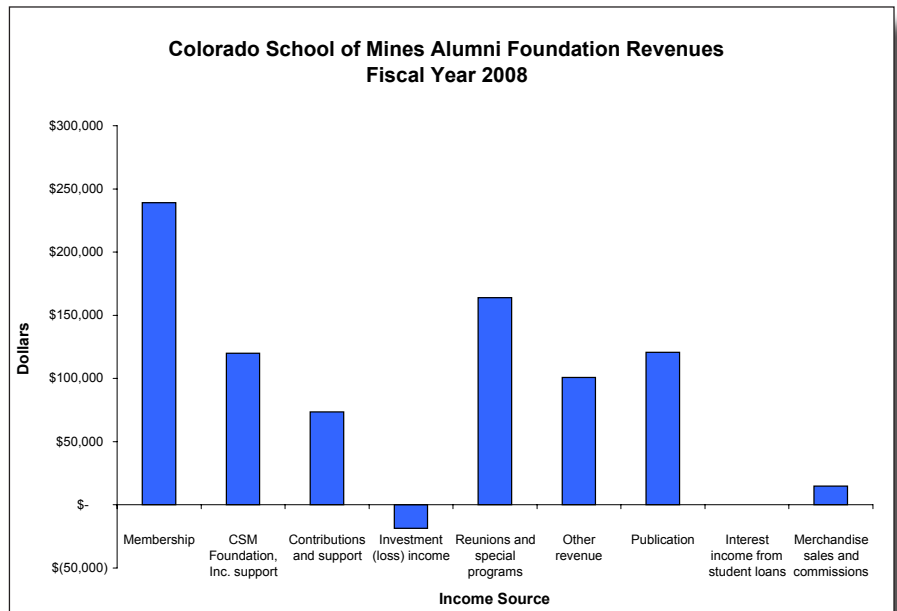
The Colorado School of Mines Alumni Association invites you to view its annual report of members and donors, published online for the first time as a cost-saving measure. As a prelude to that report, we'd like to acknowledge our appreciation for the many alumni who support us with membership and donations, and also take this opportunity to address common questions regarding membership and benefits.

Founded in 1875 and incorporated in 1936, the CSMAA has always been an independent, nonprofit, membership-based organization. While the association is charged with fostering connections among all alumni and between alumni and the school regardless of membership, money raised through membership and general operating fund dollars is the association's primary source of revenue. Have no doubt that the CSMAA, the Colorado School of Mines Foundation and the school work closely together in common purpose: to perpetuate Mines' legacy of excellence.

By supporting the association directly, members positively affect the financial position of the association regardless of other pressures that concern the school. If the CSMAA is healthy enough to stand on its own, Mines can concentrate on its core mission: to educate the best and brightest future leaders.

As partners in one another's success, the foundation supplements the association's annual budget, as does the school, with the school contributing partial funding for the magazine, some program and service support, and the full salary and benefits for the association's executive director. See the accompanying graph illustrating all sources of revenue.

Membership in the CSMAA supports four full-time employees and three part-time employees and their corresponding programs. All activities associated with the publishing of this magazine, the primary publication for the Colorado School of Mines, are managed by the association staff. Staff members plan events, both on campus and regional events

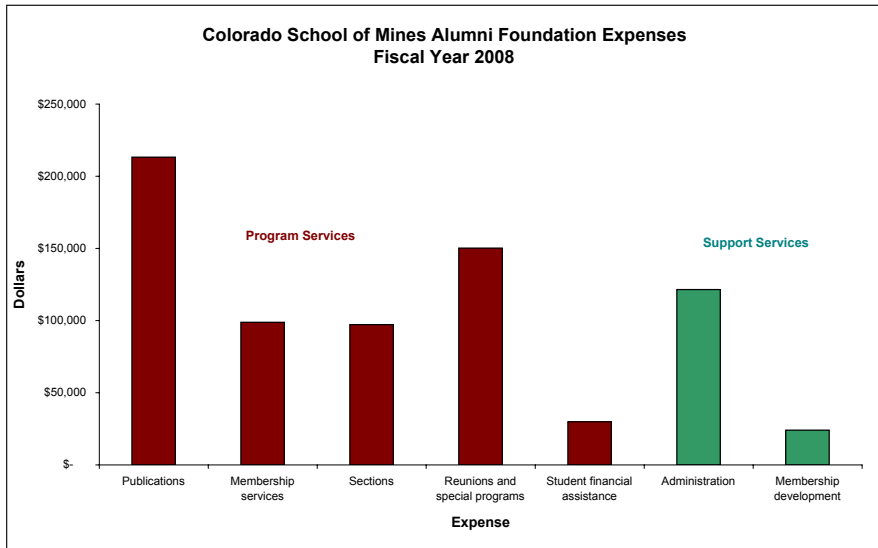


held around the world. All told, the association coordinates on average about 100 events per year. The staff supports the activities of regional sections, cultivates many volunteers, and plans programs and delivers services for both alumni and students.

Alumni join CSMAA for a wide variety of reasons. Many want to support the association's efforts simply because they value their Mines degree and are supportive of solid efforts to

elevate the school's profile. Members Jamie and Andrew Headley '93 agree: "We joined CSMAA as a way to stay connected to Mines and to show our appreciation for the opportunities that an engineering education has afforded us." Some find that membership in this exclusive organization is the best way to network with others like themselves. And many recognize that in addition to the intrinsic value of supporting the CSMAA through membership, the association also offers several tangible benefits, including a brand new national discount affiliation with hundreds of retailers. To learn more about programs and benefits, please visit mineonline.net, the new website for alumni.

At the beginning of a new year, as you consider what's important in your life, we hope that your pride and appreciation for Mines will translate to a membership in the CSMAA. Now, more than ever, your membership in the association—and your support of Mines—is needed and appreciated. To join online, click on "Join Now" when you visit www.MinesOnline.net; here you can also view the 2008 Colorado School of Mines Alumni Association Annual Report by clicking the "Members" tab.



CSM Alumni Association

Officers

Eric May '99
President

Joseph Mahoney '86
President-elect

Dick Mandel '53
Treasurer

Julia Hoagland '90
Secretary

Anita Pariseau
Executive Director

Directors

Zach Aman

Robert Applegate '03, PhD '07

Dan Baker '01

Harry Briscoe '70, MS '72

John Howe '83

Harvey Klingensmith '75

Martin Kuhn '63, MS '67, DSc '69

James Larsen '65

Stefan Magnusson '82, '85

Barry Quackenbush '65

Brandon Segura '06

Jafar Tabaian '00

Kelly Taga '00

Terrance Tschatschula

Glenn Vawter '60

Paul Wareham '85

William Warfield '75

Staff

Liz Garcia
Associate Director of Campus
Programs and Membership
Services

Cathy Mencin '83
Financial Assistant

Anita Pariseau
Executive Director

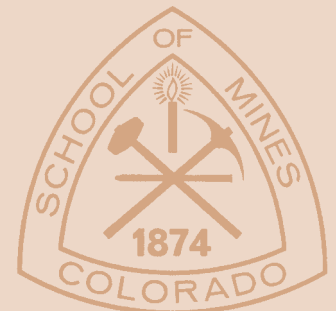
Jo Marie Reeves
Records Manager

Alison Smith
Administrative Assistant/Office
Coordinator

Serena Stickney
Associate Director of Geographic
and Special Programs

Nick Sutcliffe
Editor/Director of Communications

Nancy Webb
Administrative Assistant



1600 Arapahoe Street
P.O. Box 1410
Golden, CO 80402
Office: (303) 273-3295
(800) 446-9488, ext. 3295
Fax: (303) 273-3583
E-mail: csmaa@mines.edu

www.minesonline.net

Fast Forward

Class Notes
Weddings
Alumni Profiles
Births
Passings

1943

Archie L. Carver is retired and lives in Grand Junction, CO.

1950



Jack Weyler is the Kazakhstan manager of operations for Turan Petroleum Co. of California. Turan is

planning the drilling of several exploratory wells in the southern part of the country. He is photographed here (right) with a Parker Drilling Co. drilling superintendent at a drilling site in Kazakhstan.

1956



John P. Davis was recently reelected to his fourth, six-year term as a district judge over Nye, Mineral and Esmerald counties in Nevada. John returned to Mines in 2006 for his 50th Re-

union in his 172-Cessna, arriving a day late because of high winds over the Divide. "Better to wear out than to rust out," he maintains. Serving as the only district judge for over a decade, John has presided over several mining and water rights cases, where his engineering background has been helpful. He recalls his days at Mines with fondness and remains in close contact with **Bill Wahl '58**. John reports that Bill remains active in the mineral industry in California and Nevada.

1959

Lary G. Cahill is retired and lives in Tucson, AZ.

Charles H. McKinnis retired from IBM in 1992. Since then, he and his wife Gloria have spent much time as Christian missionaries in Chile, Guatemala, Honduras, Sierra Leone and Sudan.

John L. Stout is retired and lives in Lone Tree, CO.

1961

Richard J. Collins is a construction manager for Canadian Natural Resources in Fort McMurray, Alberta, Canada.

Don K. Henderson is co-chief executive officer for Sage Petroleum in Denver, CO.

1965

David J. Cone is retired and lives in Houston, TX.

Donald W. Peters retired from the U.S. Forest Service in January 2005 and now lives in Challis, ID.

1968

Donald L. Bryson is retired and lives in Estes Park, CO.

Thomas S. Elliott is chief operating officer and president of Rock Energy Resources in Houston, TX

1969

Robert (Bob) Smith Jr., Robert (Bob) Humphrey and **John Low '68** made a trip to Bandon Dunes, OR. The Mines headcoverers brought lots of questions. Nobody could answer, "Do you know where Golden, CO is," but after, "home of Coors Beer" the lights went on. John is the VP mining for ASARCO managing the mining operations at their Mission, Ray and Silverbell mines in the



Tucson area. Bob Smith is the executive VP of Southwest Energy, a hole explosive service company in the Southwest. And Bob Humphrey is president and owner of J.R. Kennedy Co Inc. a supplier of drilling supplies. They write, "This was our second trip together, the first being to Scotland in 1997, and we recommend both trips to all the Mines guys that love golf. Our theory is to get it done before you're out of muck! As you can see from the picture, these old stopes have been worked pretty hard."

1972

George W. Mellors is a teacher of high school engineering at Somerville High School in Somerville, NJ.

Weddings



Codey '98 and **Amy James** were married on May 24, 2008, at Mt. Vernon Country Club outside Golden. Alumni attending the ceremony included Brian Bengtson '98 (best man), Tyrell Harrison '98 (groomsman), Christopher Valdez '00, Angel Nieto '00, Brice Caldes '98, Mark Moon '00, Nicole Rose '01, Dave Clouatre '82, and Bob Brady '84.



Caitlyn Stewart '08 and **Dwyatt Jackson '07** were married on August 30, 2008. The celebration took place in Larkspur, CO, with their family and friends in attendance. Dwyatt and Caitlyn now live in Edmond, OK, and both work for Devon Energy.



Darcy Souta '08 and **Jason Stingerie '07** were married August 16, 2008 in Morrison, CO. Mines alumni in their wedding party were Chelsea Womble '08, Emily Milian '08, Emily Ruyle '08, Kyle Bennett '07, Nate Obermeyer '07, Allen Schaneman '07 and Huy Dang '07. Many more alumni were in attendance.



Chukwuemeka ME '08 and **Chikodili Uba** were married on May 24, 2008, in Lagos, Nigeria. The couple met in Nigeria and remained in communication while Chukwuemeka attended Mines for his master's degree. They were married just two weeks after graduation.



Emily Gibson '05 was married to **Aaron Lane '04** in Hanalei Bay, Kauai, on September 21, 2008. Mines alumni in attendance were Cathy Tolliver '06 and Chuck Burris '02.

To include your recent wedding in *Mines* magazine, email details to magazine@mines.edu, and include a selection of high-resolution digital images.

1973

Richard M. LiConti is director of coal advisory services for Ventyx in Boulder, CO.

Gregory K. Staff is a senior project manager for Bobcock Eagleton, Inc. in Houston, TX.

1975

Bruce R. Bergeson is principal of Bergeson Technology Services LLC in Novi, MI.

Mark S. Foxwell is a rig manager for Enasco Australia Pty. Ltd. in West Perth, Western Australia.

Rich Rein was instrumental in the successful completion of the Koala underground diamond mine for BHP Billiton Diamonds. He has now agreed to be the study manager for the pre-feasibility of the first new underground potash mine in the province of Saskatchewan since 1975. Rich lives in Evergreen, CO.

1976

Michael P. Cleary is drilling advisor for Delta Petroleum Corp. in Denver, CO.

Charles A. Hansen is retired and lives in Las Cruces, NM.

T. Arthur Palm has recently retired. He and his wife, Cherie, have returned to Price, UT.

1977

Robert L. Davidoff is the director of the Office of Minerals Evaluation in the U.S. Department of the Interior in Lakewood, CO. He leads a staff that is responsible for performing mineral assessment and market analyses of mineral estates for all Indian lands.

Barry L. Gidman is business development geologist for Stone Energy Corporation in Lafayette, LA.

Allen E. May is chief executive officer for Elang Energy. He lives in Vero Beach, FL.

1978

James B. Logan is data systems manager for Burlington-Edison School District in Burlington, WA.

Upcoming taxes got you down?



A gift to the Colorado School of Mines Foundation can result in a favorable income tax deduction and, if put into a life income plan, could enhance your income immediately.

For more details contact David Mays
*Assistant Vice President for
 University Advancement*
 david.mays@is.mines.edu
 303.273.3140



COLORADO SCHOOL OF MINES
FOUNDATION

Providing service and information
 for charitable planning.

1979

A. Silvana Cusati is business manager for NCT Estudios Y Proyectos Inc. in Windermere, FL.

Kenneth J. Konrad is director of mergers and acquisitions for BP in London, UK.

Luis J. Rodriguez is business development manager for Air Products Canada Ltd. in Calgary, Alberta, Canada. He lives in Oakville, Ontario.

John L. Rovero is based in Japan and serves as lieutenant colonel and deputy of operations for the Naval Facilities Engineering Command, Far East.

1980

Patrick D. Allen is an information operations specialist for the Johns Hopkins University Applied Physics Lab in Laurel, MD.

John A. Barnes is director of operations and maintenance for CH2M Hill, Inc. in Anchorage, AK.

Brian K. Damkroger is a rancher and writer in Livermore, CA. Brian, his wife Trish, and children Chris and Danielle, raise and train Tennessee Walkers, Missouri Fox-trotters, and American Quarter Horses.

Russell C. Fontaine is principal hydrogeologist for Schlumberger Water Services in Denver, CO.

Timothy F. Krusmark is director of special projects for Lafarge North America—Lakes and Seaway Cement in Bingham Farms, MI.

Donald B. Ratcliff is vice president of marketing and risk management for the Apex Silver Mines Corporation in Denver, CO.

1981

Mark J. Ludwig is vice president of operations for Neutron Energy in Centennial, CO.

W. David Tyler is study director for Newmont Gold Company in Englewood, CO.

Thomas L. Young is a drilling engineer for Woodside Energy Limited in Perth, Western Australia.

1982

Stefan G. Magnusson is managing director-head of market risk—Americas of Rabobank International in New York, NY.

1983

Craig R. Hofmeister is sales manager for Merpro Americas, Inc. in Houston, TX.

1984

Grant C. Dewey is a teacher and an assistant principal for Taejon Christian International School in Taejon, South Korea.

Leonard N. Hill is a strategic commodity manager for Freeport-McMoRan Copper & Gold Inc. in Phoenix, AZ.

C. Barclay Macaul II is manager of customer satisfaction for the Computer Modelling Group Ltd. in Calgary, Alberta, Canada.

Ty S. McKercher is a global solution architect in applied engineering for the NVIDIA Corporation. He lives in Kingwood, TX.

Robert S. Michel is a project manager for MTB Project Management Professionals in Greenwood Village, CO.

Cynthia Wood Newton is a senior mine engineer for Neutron Energy Inc. in Albuquerque, NM.

1985

David J. Roth is chief scientist for the U.S. Dept. of Defense at the Pentagon.

1986

Susan McFaddin is the sole owner of Seven Generations, LLC, in Fort Collins, CO. Seven Generations LLC, offers sustainable consulting including LEED, Green Globes, Energy Star and sustainable management plans. They recently developed the first LEED Platinum building in Northern Colorado.

R. Bret Rhinesmith is retired and lives in Big Horn, WY.

Sheila J. Roberts is an associate professor and chair of the Geology Department at Bowling Green State University in Bowling Green, OH. Her new responsibilities keep her busy, but she finds time to do research on water quality issues in the area.

1987

Melanie Marquardt Westergaard is a senior geophysical advisor for Forest Oil Corporation in Denver, CO.

Profile

Alumnus Virtually Illuminates the Magical Kingdom

At the intersection of art and technology, where mathematical computer modeling meets lighting design in the animated movie industry, you'll find Chris Springfield '91.

The artist/engineer just wrapped up three and a half years of work on the recently released computer-animated Disney movie, *Bolt*. Springfield supervised the lighting on a number of scenes, overseeing, as he describes it, the mathematical modeling that set up the computer-generated lighting, enabling artists to manipulate which objects get lighted and how.

"It fits in with the animation heritage of Disney," he says, when artists painted backgrounds with painstaking detail. "We're the next generation of background design," in which lighting is adjusted, virtually, to achieve the desired artistic look.

Much has been made in the press of *Bolt's* "painterly sensibility." The set design intentionally evokes the paintings of Edward Hopper and the lighting of famed cinematographer Vilmos Zsigmond; Springfield, as "sequence lead," was part of a team of more than 300 artists and software engineers who made the aesthetic possible.

Bolt is the latest in a string of films on which Springfield has worked in an 11-year career with Walt Disney Animated Features, starting as a software engineer and increasingly specializing in the lighting aspect of virtual set design. His movie credits include *Chicken Little*, *Home on the Range*, *Treasure Planet* and *Tarzan*. Along the way, he picked up a 2003 Academy Award for technical achievement in virtual illumination.

What seems an unlikely marriage of disparate fields comes naturally to Springfield, the son of an artist and a geologist who together formed a successful map-making business. He loved acting in grade-school plays; by high school he was making short films. At Mines and while pursuing his doctorate in applied physics at the California Institute of Technology, he was involved in all aspects of student theater. "It's funny telling people I was involved in theater at two different engineering schools," he says.

With a friend at Cal Tech, Springfield co-wrote, directed



and produced the feature-length film *Green Eggs and Hamlet*, a Shakespeare-cum-Dr. Seuss production. "We shot the whole movie with a digital camera," he says, "which was kind of cutting edge at the time."

The movie, and his connections in both the physics and theater departments, led him to put his PhD on hold so he could work on computer graphics

in the movie *Dante's Peak*.

Completing his degree at Cal Tech gave Springfield a renewed appreciation of his experience at Mines. "A lot of the (Mines) team-building curriculum has translated directly into my work, both in graduate school and in my profession."

In the world of computer-generated virtual lighting, look for the spotlight to continue to shine on Chris Springfield.

1988

Benjamin Benson is president of ENERGYneering Solutions, Inc. in Oregon, which provides mechanical engineering and design services, specializing in renewable power sources.

Vivek Chandra has recently relocated to Melbourne as the business planning and investments manager at Nexus Energy. He is an international natural gas professional with extensive experience in US, Alaska, and Middle East. In 2006, Vivek Chandra authored a best-selling book entitled *Fundamentals of Natural Gas*, which was published by Pennwell, the publishers of the *Oil and Gas Journal*. He also maintains a natural gas information website (www.natgas.info) and runs industry training courses.

Gregory P. Nickel is chief geologist for the U.S. Silver Corporation in Wallace, ID. This is his third tour back to the underground mine where he started his career, identifying and

drilling multiple favorable vein targets with substantial silver copper lead values.

1989

Gregory L. Davoll is vice president of marketing for Newmerix Corp. in Superior, CO.

Martyn S. James is a consultant for Martyn James Consulting in Farnham, Surrey, UK.

Brian K. Owens is Infantas RMT Manager Magdalena Medio for Occidental Colombia in Bogota, Colombia.

Gehrig S. Schultz has joined Prospectiuni SA as chief executive officer. Prospectiuni is a Romanian seismic company with a 50-year history of providing geological and geophysical services in Romania and around the world.

Tom J. Walker is an operations engineer for Newfield Rocky Mountains Inc., a division of Newfield Exploration Company, in Denver, CO.

Shannon G. Wright is a civil engineer for CH2M Hill, Inc. in Sacramento, CA.

1990

Justin A. Bilyeu is owner and process engineer for Snone Engineering, LLC in Palisade, CO.

Robert S. Merrill is head of audit downstream and trading for Shell International Ltd. in London, UK.

Bjorn Ostebo is a completions engineer for Chevron. He lives in Maracaibo, Zulia, Venezuela.



**Frontier-Kemper
Constructors, Inc.**

Excellence in Heavy Civil & Mining Construction



PO Box 6690
Evansville, IN 47719
(812) 426-2741 Phone
(812) 428-0337 Fax
www.frontierkemper.com
information@frontierkemper.com

ORE THE DIGGER

NEWSPAPER

Coverage of campus events,
departmental research,
academic lectures,
and student life
at CSM



www.oredigger.net

revitalized and renewed



Class of 2029



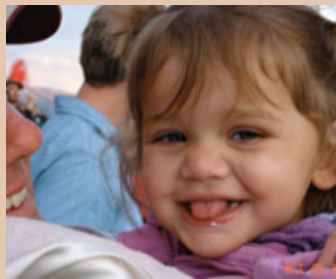
Stephen '97 and **Mariko Takaki Turner '97** welcomed **Amy Kei** on March 24, 2006.



Robert and Bernadette Jones '03 are proud to introduce their son, **Michael Roland**, born March 18, 2008.



Matthew and Jennifer Frary '03 announce the birth of their son, **Jace Eli Frary**, born August 12, 2008.



Craig J. Meis '94, his wife, **Carrie**, and their four children recently welcomed **Zoe** to their family (see Class Notes).



Jessie (Verizzo) Kaven '95 and her husband, **Rick**, are proud to announce the birth of their daughter, **Madeline Ouida Galeana Kaven**, born August 13, 2008, in Austin TX.



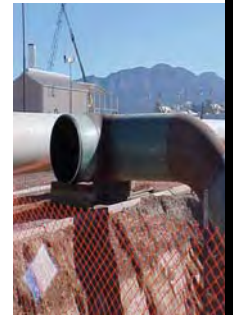
ForeRunner Corporation

WE ARE A FULL SERVICE PROGRAM/PROJECT MANAGEMENT, ENGINEERING, DESIGN, AND FIELD SERVICES FIRM SERVING THE ENERGY INDUSTRY.

ForeRunner Corporation is currently looking to fill the following positions:

- Project Managers
 - Process Engineers
 - Electrical Engineers
 - Controls Engineers
 - Civil/Structural Engineers
 - Mechanical Engineers
 - Pipe Stress Engineers
 - CAD Technicians
- Piping, Mapping, GIS

If you want to work for a growing company with a flexible schedule, friendly environment, and great locations then you should be talking to us! We offer a comprehensive benefits package, competitive salaries and a culture that believes our employees deserve a great place to work. We are a company of engineering professionals, not a stuffy engineering company. What that means to you is a creative, less structured, free to learn and grow environment. Candidates should have a proven track record plus interpersonal skills to interact with employees and clients.



Visit our website:

www.forerunnercorp.com Send your resume to **Joe Vickrey** by fax at 720-889-9439 or email to employment@forerunnercorp.com

1991

Daniel G. Constance has opened his medical practice, Daniel Constance, M.D. PLLC, in Lawton, OK. Dan specializes in sports medicine and internal medicine.

James H. Ruble III is director of engineering and project development for Alon USA in Krotz Springs, LA.

John H. White III is owner of Ponderosa Mineral Consultants, LLC in Bergen Park, CO.

1992

Sue A. Ehlers is a senior construction engineer for Malcolm Pirnie in AZ.

1993

Bryan M. Christjansen is general manager for a new fuel ethanol facility, Poet Biorefining, in North Manchester, IN.

Torsten M. Lyon is vice president of

engineering for Veran Medical Technologies in St. Louis, MO. He lives in Golden, CO.

Eric T. Lyons is a senior systems engineer for Stone Technologies, Inc. in Chesterfield, MO.

1994

Felipe Azocar H. is general manager for Metalica Consultores S.A. in Las Condes, Santiago, Chile.

William J. DeCooman, Jr. is vice president of finance and corporate development for Candente Resource Corp.

Robert M. Gray is director of RMB Resources Limited, the resources merchant banking business of South Africa's FirstRand Ltd. He is based in Melbourne, Australia.



Craig J. Meis was recently reelected as county commissioner for Mesa County, CO. Craig continues to work for Cordilleran Compliance Services Inc. in Grand Junction, CO, which he originally founded, and recently sold to Olsson Associates. Included in the accompanying photograph are Craig's wife, Carrie, and their children Ben (12), Emma (10), Zach (9), and Matt (6). Their youngest, Zoe (18 Months) is featured in Class of 2029. Matt and Zoe have joined Craig and Carrie since they became foster parents for the county seven years ago. Craig writes, they "never intended to adopt, but as you can see, life didn't go as planned and certainly for the better."

Profile

Bolts from the Blue: A Journey from Engineer to Playwright

The moment of inspiration came one drab day on the 26th floor of a Holiday Inn in Wichita, KS. An Amoco research engineer at the time, Roger Rueff '78, MS '83, PhD '85 had been ruminating on an idea for a play for several months. "I found myself in a hospitality suite with a salesman and an account manager, and it struck me as the perfect setting for the play," said Roger.

The highly successful script he went on to write is titled *Hospitality Suite* and tells the story of three men working for an industrial-lubricant firm, who are at philosophical loggerheads with each other. Since it premiered at the South Coast Repertory Theatre in Costa Mesa, CA, in 1992, the play has been produced around the world and made into a feature film, *The Big Kahuna* (2000), which stars Kevin Spacey and Danny DeVito.



The journey from selling lubricants in Wichita, KS, to rubbing shoulders with Kevin Spacey was exciting and transformative for Roger. And a bit ironically, one of the people most instrumental in helping him on his way was a fellow Miner, Mark Furlong MS '79, PhD '81, whom he first met at an audition for the role of E-Days Talent Show emcee in 1978.

Although their paths crossed on several occasions on campus, they didn't actually become friends until 1985, when Mark recruited Roger to work with him at the Amoco Research

May 6-9, 2009

Reunion

2009



Stay tuned for future announcements!

Our featured events include:

- Reunion Dinners
- Campus Tours
- Faculty Symposium
- Graduation & Alumni Banquet
- Geology Trail Walk
- Earthquake Center Tour

Start making your hotel reservations now!

Golden Hotel: 303-279-0700 or 800-233-7214

Table Mountain Inn: 303-277-9898 or 800-762-9898



For more information, please call: (303) 273-3295 or (800) 446-9488, extension 3295 csmaa@mines.edu

Center on the outskirts of Chicago. Some months later, after learning that Mark was involved in community theater, Roger asked if he could tag along to an audition. They both came away with roles, and although he probably didn't know it at the time, Roger also came away with a whole new direction for his writing life.

"Up to that point, I only wrote short stories and poetry," said Roger. "It wasn't until I got involved in community theater that I said to myself, 'I like plays. I should try to write one.'" From there, one thing led to another. "I started writing plays, got to know a director, who I didn't realize at the time knew Kevin Spacey, who ended up getting a reading of the play in New York, which got the script to the William Morris Agency, which sent the script out to the South Coast Repertory Theatre, where it premiered," Roger recounts. And he chalks his lucky break up to the Mines connection. "Really, it's because of another Mines guy, Mark, that I've got a movie and have had plays produced around the world!"

While Roger's career is hardly typical for a Mines graduate, he says there's a creative continuity between his two careers. Playwriting and engineering both involve the occasional "aha moment," he says, and a fair amount of problem solving. "If something doesn't work, you have to find out why. In creative writing, that means finding the spine of the story."

One of his finest moments as an Amoco research engineer

was a burst of insight he had concerning paraffin wax production—his first assignment. "The way they made paraffin wax used a process from 1895. For years, it had been a black art. You could never tell what kind of wax you would get, or how much." Two graphs had long been used to analyze the process, and neither revealed anything fundamental.

He was relaxing with his feet up on the desk when inspiration hit. "I said 'Oh, my God! There's a third graph that generates the other two, and you can use it to make important changes in the process,'" said Roger. "I realized that the two graphs were like two adjacent sides of a cube—and no one had ever looked at the third side adjacent to them both. In the end, the process changes increased wax output 30 to 50 percent with no capital investment and allowed them to predict the product composition for the first time in almost 100 years." Engineering and creative writing have a lot in common, Roger believes, including those bolts from the blue.

Roger now writes full time and runs his own company, Write Now, Inc., where his engineering background supports the many technical projects he takes on for commercial clients. "That's my bread and butter," he says. And when he's not chasing one of his client's deadlines, he continues to write for theater. An L.A. Drama Critic' Circle double-award-winning play of his, *So Many Words*, just finished a four-week run at Seattle's Theater Schmeater in December.

Alumni

Fast Forward

Kevin M. Moore is a program manager for Hill International. He lives in Golden, CO.

Michael W. Patton is a technical expert in underground mining for PT Freeport Indonesia in Tembagapura, Papua, Indonesia.

Christopher J. Rando is a process engineering manager for Freescale Semiconductor. He lives in Wappingers Falls, NY.

Gustave W. Schlesier is program manager of future systems for BAE Systems, TSS in Silver Spring, MD.

Peter R. Stout is a senior forensic scientist for RTI International in Research Triangle Park, NC.

1995

Jay C. Davenport is an assistant construction project manager for the Oregon Department of Transportation in Bend, OR.

William P. Dobler is Permian Basin operations manager for Schlumberger in Midland, TX.

1996

M. Brad Flavin is the Rocky Mountain regional manager for Hanes Geo Components in Denver, CO.

Brandi A. (Lewis) Goodman is manager of supply chain engineering for Schneider National in Green Bay, WI.

Scott A. Goodwin, Jr. is division operations manager for Questar Exploration and Production in Denver, CO.

Jennifer J. Holt is a project scientist for the National Geospatial-Intelligence Agency in Reston, VA.

Darvin H. Jones is a senior project manager in the offshore oil and gas sector for Technip USA in Houston, TX. Projects involve EPCI for floating and fixed/topsides structures. He is also a retired lieutenant colonel, U.S. Army, and came to Mines to study under Gene Woolsey's Operations Research Program.

Jonathan S. Keller is a supervisory electronics engineer for the Department of Defense in Tinton Falls, NJ.

Mary C. Portillo is a professor at the University of Houston-Downtown.

Robert D. Scott is lieutenant commander and platform systems engineer for the U.S. Navy in Elizabeth Bay, New South Wales, Australia.

Thorsten Viertel is BDM XTL and CO₂ manager CCE-XTL for Shell Gas and Power International.

1997

Kirk L. Johnson recently left BP Alaska to be closer to family in Colorado. He is now a projects manager for ConocoPhillips in Farmington, NM.

James D. Prock is an exclusive agent for Allstate in Pelham, AL.

Brian W. Robbins is a senior tech support engineer for Baker Oil Tools in Bakersfield, CA.

Thomas Q. Roussel is an associate for Resource Capital Funds in West Perth, Western Australia.

David M. Scobel is a project consultant for Superior Pipeline in Denver, CO.

1998

Michael P. Dolan is a consulting geologist for Dolan Integration Group LLC in Boulder, CO.

Christiaan M. Huizer is upstream commercial finance manager for Shell International Exploration & Production in Houston, TX.

Codey James (see "Weddings") is a senior petroleum engineer at Resolute Natural Resources Company in Denver, CO.

Travis T. Moore is lead electrical engineer for the Black and Veatch Corporation. He lives in West Leederville, Australia.

GIFTS OF APPRECIATED PROPERTY ARE APPRECIATED

You can use securities or other capital assets to make charitable gifts to the Colorado School of Mines Foundation. As with any gift, you will gain the satisfaction of knowing you are providing for Mines' students, faculty and programs. Benefits of your gift may also include an income tax deduction and avoidance of capital gains tax.

Gifts of real estate may also be accepted by the CSMF Property Management Corporation, whose unique expertise could help relieve you of management and environmental issues associated with the property.

Contact Linda Landrum (303.273.3142) or David Mays (303.273.3140)



COLORADO SCHOOL OF MINES
FOUNDATION

Derek R. Trebilcock is IT manager for Sun Microsystems, Inc. in Broomfield, CO.

Amber T. Vail is a structural engineer for Wallace Engineering in Holyoke, MA.

1999

Mohan B. Dangi is a doctoral candidate in the Department of Geography and Environmental Engineering at the Johns Hopkins University in Baltimore, MD.

J. Erin Evans is principal mechanical engineer for JED Resources, LLC in Castle Rock, CO.

Andrew P. Lathrop is a solution specialist for Oracle Corporation. He lives in Castle Rock, CO.

Brice F. Lodugnon is the director of Emerging Capital Partners LLC in Abidjan, Cote d'Ivoire. Emerging Capital Partners LLC is a private equity fund management company focusing on investments in Africa.

2000

Jennifer Ayers Brasher is a transmission manager for EON Climate and Renewables North America Inc. in Austin, TX.

2001

Jonathan B. Cowan is a development associate for Trammell Crow Company in Houston, TX.

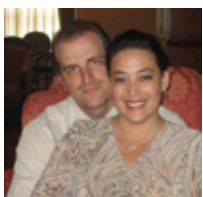
Kip O. Findley is an assistant professor of metallurgical and materials engineering at the Colorado School of Mines.

Tanya Barb Hanford is a project manager at Winter Ridge Energy in Denver, CO.

Jonathan J. Kepler is a project manager for Air Liquide in Paris, France.

Robinson A. Usagani is a project engineer for Jirsa Hedrick & Associates in Denver, CO.

2002



Eric and Magdalena (von Haas) '00 Boogaard recently celebrated their fifth wedding anniversary in Chicago. They were married in August 2003 in Denver. Eric

is an account manager for Bosch Rexroth Corporation and Magdalena is a project

manager for Robert Bosch LLC. They live in West Bloomfield, MI.

Terri L. Erb is a drilling engineer for EnCana Oil & Gas (USA) Inc. in Denver, CO.

Amanda M. Kelly is a communications officer for the U.S. Air Force. She lives in Annapolis, MD.

Cambrey S. Salazar is a geophysicist for Weinman GeoScience—a division of Global Geophysical in Denver, CO.

Robert C. Sawaya is manager of integrity management for SourceGas in Lakewood, CO.

Kathryn Heidrich Valdez is a manager of environmental policy for Xcel Energy, Inc. in Denver, CO. In November 2008, she also earned her MBA from the Daniels College of Business at the University of Denver.

Claudio A. Valencia is director of strategic design for Codelco in Santiago, Chile.

Angela I. Vannucci-Gimenez is controller for Blackburne & Brown Mortgage Co., Inc. in Sacramento, CA.

Jennifer L. White is a petrophysicist for Chesapeake Energy. She lives in Edmond, OK.

2003

Lisa M. Billy is a transmission system planning engineer at Tri-State Generation and Transmission Association in Westminster, CO.

Courtney Beard Bird is a project manager for Jacobs Engineering Group Inc. in Houston, TX.

Matthew R. Bird is a district engineer for ConocoPhillips Pipe Line Company in Pasadena, TX.

Charles Douglas-Hamilton is a senior geologist for Anvil Mining Services in the Democratic Republic of Congo.

Hermann F. Logsend is associate director of the energy group for ATB Corporate Financial Services in Calgary, Alberta.

Victoria U. Okotie is a production engineer for BP Exploration in Houston, TX.

Nicholas Alexander Podolak is a test engineer for Aerojet in Redmond, WA.

John K. Reinsma is senior development manager for Weston Solutions in Lakewood, CO.

G. Dante Ramirez Rodriguez is a principal engineer for SRK Consulting in Lakewood, CO.

Ruthie Coors Swartzlander is a plant manager for CoorsTek, Inc. in El Segundo, CA.

Valerie A. Zagnoli is a senior staff engineer for Kennedy/Jenks Consultants in Irvine, CA.

2004

Alfred T. Aird is mine manager for Chemical Lime Co. in New Braunfels, TX.

Emily L.M. Bostwick-White is a process engineer for Jacobs Engineering Group Inc. in Golden, CO.

Joshua L. Burgher is the director of strategic planning and analytics at Columbia University, New York, NY. He is also enrolled in the executive MBA program at Columbia Business School.

Jamie M. Davenport is a chemical engineer and safety officer for IdaTech, a hydrogen fuel-cell research company in Bend, OR.

Richardo Labo Fossa is chief adviser of communications and external relations of the La Granja Copper Project for Rio Tinto in Lima, Peru.

Tony Hahn is a commander and executive officer for Coast Guard Air Station Borinquen in Aguadilla, Puerto Rico.

Bonnie E. Harber is field service manager for coiled tubing for Schlumberger, Ltd. in Stavanger, Norway.

Keith G. Isberg is an engineer II for Shaw Power Group in Centennial, CO.

Patricia B. Moran is a geochemist for Tetra Tech in Golden, CO.

Emily P. Yocom is a flight test engineering analyst for Boeing in Seattle, WA.

2005

John A. Antwi is manager of corporate development for Newmont Mining Corporation in Denver, CO.

Felipe H. Alves is an analyst for RMB Resources in Lakewood, CO.

Jennifer Jmieff is an engineer for Xcel Energy Inc. in Denver, CO.

Bryce D. Lakamp is a production engineer for Firth Rixson–Forged Metals Inc. in Fontana, CA.

Micah J. Leadford is a project engineer for Milender White Construction Co. in Arvada, CO.

Michael A. Martinez is teaching in the math department at the U.S. Air Force Academy in Colorado Springs, CO.

ChangSoo Moon is a senior geotechnical engineer for Parsons Brinckerhoff in New York City, NY.

Firuz Avaz Salamov is a geophysicist for BP in Baku, Azerbaijan.

Donald D. Walker is a development geologist for ConocoPhillips in Houston, TX.

2006

Emmanuel A. Barrois is a reservoir engineer for Total E&P Nigeria in Port-Harcourt, Nigeria.

Angela C. Blea is a transportation engineer for URS Corporation in Denver, CO.

Hannah L.D. Briggs is an engineer for Northrop Grumman. She lives in Los Angeles, CA.

Christopher A. Green is a senior petroleum engineer for Perenco Holdings in Paris, France. He lives in Standish, Wigin, UK.

Jesus A. Pinto works in support and ID for PDVSA-INTEVEP in Los Teques, Venezuela.

Jordan M. Self is a mechanical engineer for Pearl Harbor Naval Shipyard & Intermediate Maintenance in Pearl Harbor, HI.

Mandi R. Stewart is fiduciary services analyst for Thomson Reuters in Denver, CO.

2007

Justin C. Chichester is a contracts engineer for ExxonMobil. He lives in Houston, TX.

Richard M. Diaz is an operations technician for Connors Drilling, LLC in Montrose, CO.

Thor V. Haraldsen is a drilling optimization engineer OASIS for Hughes Christensen in Tanager, Norway.

Heather Jones is a reservoir engineer for Petro-Canada, Inc. in Denver, CO.

Kyle J. Kane is an engineer I (mechanical engineer) for URS Washington Division in Denver, CO.



Soar to Great Savings!

Join the Colorado School of Mines Alumni Association discount program!

The Colorado School of Mines Alumni Association is proud to offer its members, including the "M"-ulators, exclusive discounts from thousands of local and national vendors. Join the Colorado School of Mines Alumni Association Discount Program, provided by Percline, by going to www.minesonline.net and click on Special Offers under the Members tab.

As a dues-paying member of CSMAA, you will also qualify for the following:

- Group discounts on auto, home and renters insurance from Liberty Mutual.
- Bank of America CSM Platinum Plus® Mastercard, which comes with top quality benefits and no annual fee. In addition, you'll have the satisfaction of knowing that the Bank of America makes a contribution to the alumni association every time you use the card at no cost to you.
- Credit Union of Colorado (CUOFCO) welcomes CSMAA members with a free box of checks with a special CSM design every time a new checking account is opened. Members also will get a special .25 percent APR discount when refinancing an auto loan from another lender.

Discover new merchant benefits in a city near you! Go to www.minesonline.net and click on Special Offers under the Members tab.

Colorado School of Mines Alumni Association Discount Program

The Percline national vendor network provides you with discounts from over 18,000 hotels, 9,000 florists, 5,500 car dealerships, over 6,000 restaurants and about 90,000 annual concerts/events in the U.S.



Jonathan P. Parker is an associate geophysicist working in the Rocky Mountain Oil Asset Team for Marathon Oil Corporation. He lives in Houston, TX.

Owen M. Ryan is a completions engineer for ConocoPhillips in Houston, TX.

Mirna I. Slim is a research assistant at Massachusetts Institute of Technology.

Scott A. Smith is a lieutenant colonel and a systems analyst for the U.S. Army. He lives in Valrico, FL.

Zachary T. Spence is an operations engineer for Noble Energy Production, Inc. in Denver, CO.

Jason C. Stingerie (see "Weddings") is a design engineer II for Baker Hughes in Houston, TX.

Christopher R. Wooten is a metallurgist for Freeport-McMoRan Copper & Gold Inc. in Hurley, NM.

Patrick J. Wright is a management associate for Gerdau Ameristeel in Baldwin, FL.

2008

Rafat A. Al-Dhuhayan is a planning engineer for Saudi Aramco. He lives in Dhahran, Saudi Arabia.

Robert Donley is a mechanical engineer for Protonex, LLC in Broomfield, CO.

Daniel A. Funderburk is a structural engineer for Anvil Corporation in Bellingham, WA.

Dustin J. Haynie is a project development engineer of Gasification Capital Projects for ConocoPhillips. He lives in Houston, TX.

Benjamin A. Hildebrandt is an applications engineer for GEA Power Cooling Inc. in Lakewood, CO.

Vladislav D. Kaufman is a utility and energy specialist for Oldcastle Materials in Kansas City, KS.

Brent A. Koren is a consultant for Science Applications International Corporation (SAIC) in Houston, TX.

Marco A. Murillo is a mining engineer III for Newmont in Carlin, NV.

Derek C. Nash is a reservoir engineer for the Southern Africa Strategic Business Unit for Chevron in Houston, TX.

Timothy L. Pasquarelli is a managing partner for International Peril Mitigation Services (IMPSServe) in Golden, CO.

Jacob Sievers is a field engineer for Pathfinder Energy Services in Lafayette, LA.

Darcy B. (Souta) Stingerie is an upstream engineer for ConocoPhillips in Houston, TX (see "Weddings").

Chukwuemeka H. Uba is a drilling engineer for Chevron North America Exploration & Production in Covington, LA (see "Weddings").



"My career has been everything they said it would be...and much more."

Nalita, Field Engineer

"From the beginning my recruiter gave me a very good idea of what to expect from the field engineer job: the challenges of working in the field, the training and mostly, about all the opportunities Schlumberger can offer if you're ambitious and ready to work hard. I admit that I expected some resistance as a woman in a traditionally male dominated industry. But from my first day I was treated as an equal. I went through intense training – industry-leading training. And when I reached my first assignment in the oilfield, I was more than ready. Now I have my entire career to look forward to. I might stay in the field. I might move into management. At Schlumberger, it's up to me."

As a field engineer, Nalita and her crew work at the client wellsite performing services that will improve the knowledge and performance of the reservoir. Nalita holds a BS in Electrical Engineering from Colorado School of Mines.

Schlumberger is the leading oilfield services provider, trusted to deliver improved exploration and production performance for oil and gas companies around the world. We employ more than 70,000 people of over 140 nationalities working in more than 80 countries. Schlumberger is an equal opportunity employer.

Schlumberger

For further information or to
apply for a job go to:
www.slb.com/careers

Success without boundaries

Passings

To live in hearts we leave behind
is not to die.

—Thomas Campbell 1777-1844



RUSSELL C. ALSTATT '50 of Wilmington, NC, died on January 7, 2008. Born in Denver, he graduated from Mines with a degree in petroleum engineering before serving as a combat engineer for the U.S. Army in the European Theatre during World War II. Russell saw action at the Battle of the Bulge, crossing the strategically significant Ludendorff Bridge

at Remagen before it was fully secured by the Allies. He was a member of the Elks Club and Disabled American Veterans. After the war, Russell worked for 33 years as a nuclear engineer with General Electric in Hanford, WA; San Jose, CA; and Wilmington, NC. He is survived by his high school sweetheart and wife of 61 years, Twanette Kauble; three daughters, Diana Street, Vicki Thayer and Shelley Gupton; five grandchildren; and four great-grandchildren.



ROBERT L. BESEDA '52 died on February 24, 2008. A member of the Beta Theta Pi fraternity, Robert graduated from Mines with a degree in geological engineering. That same year, he became a father and began his service in the U.S. Army Corps of Engineers, which took him to Korea for a portion of the war. During his career, Robert worked in the

uranium business as a prospector and a uranium mill manager in Riverton, WY. He also worked at a lightweight aggregate plant in San Clemente, CA, and designed rotary kilns and dryers in Los Angeles. He subsequently went on to become chief engineer for the original producers of the Tidy Cat and Kitty Litter brands, oil absorbents and other dried clay products, where he stayed until he retired. His interests included hunting, fishing and breeding Great Pyrenees. He also constructed a geodesic dome kennel, planted a vineyard and experimented with wine making. After his wife's death, Robert took on the design and construction of a three-story, cube-shaped, steel-framed house in Texas. He is survived by his sons, Scott and Jim; daughters, Marti Jones and Debi Beseda-Hart; seven grandchildren; and four great-grandchildren.



GEORGE C. BODINE, JR. '48 of Chattanooga, TN, died on May 16, 2008. A member of the 1939 undefeated football team and Alpha Tau Omega fraternity, George's studies at Mines were interrupted by military service. During World War II he served in the U.S. Army in both the European and Pacific Theaters, achieving the rank of first lieutenant. George later graduated from Mines with a degree in metallurgical engineering. During the course of his career, he worked

for U.S. Steel Corp, the Fansteel Metallurgical Corp., the Wall Tube and Metal Products Co., Combustion Engineering Inc. and Power Systems Div. He returned to school later in his career, earning a master's degree in metallurgical engineering from the University of Tennessee in 1974. In 1989 he received the Russ B. Ogden Award, Committee B-10 on Reactive and Refractory Metals and Alloys Award, honoring his achievements in the science and technology of reactive and refractory metals and alloys. After retiring, he was active in the Chattanooga art community as a member of the Association of Visual Arts and the Watercolor Society. He was a prolific poet who enjoyed music and dancing, and he took pleasure in volunteering at a local hospital. He was predeceased by his first wife, Dorlis J. Bodine, and his daughter, Doree Graham. He is survived by his second wife, Mary Ann Bodine; daughter, Lynn Graham; son, Michael; a granddaughter; and two great-grandchildren.

FLOYD L. BROWN '43 of Prescott, AZ, died on March 29, 2008. Born in Colorado Springs, Floyd graduated from Mines with a degree in metallurgical engineering. While attending the school, he met his future wife, Gayle, who was then a student at Denver University. After their marriage, they moved to Verona, NJ, where he completed his master's degree in metallurgy at Steven's Institute of Technology. In the postwar nuclear industry, Floyd enjoyed a long career as a nuclear engineer working primarily for Argonne National Laboratory outside Chicago. He remained with the ANL until his retirement in 1985, save a brief four-year tenure with General Atomic in San Diego during the late '50s and early '60s. Throughout his life he remained deeply committed to his family. Described as a handyman par excellence, Floyd was known to visit family and friends with toolbox in hand. He and Gayle travelled extensively throughout their life together, visiting every continent except Antarctica. At home, Floyd was active with the Lions Club and the Unitarian Universalist Church, and enjoyed square dancing and skiing. He is survived by his wife of 63 years, Gayle; his daughters, Pamela Dizikes and Cynthia Tatum; his son, Richard; four grandsons; three great-grandchildren; and his brother, Robert Brown '44.



JACK S. CORLEW '39, MS '68, PhD '72 of Golden, died on April 18, 2008. Born in Utah, Jack grew up in Denver and attended Golden High School before coming to Mines. A member of Beta Theta Pi, Jack earned a degree in petroleum engineering. From 1939 until 1972, he worked for Sinclair Refining Company, dividing the majority of his time between the East Chicago Refinery, the Sinclair Wyoming Refinery and the company's New York office. In 1945 he married Marcine Lentz, with whom he raised three children. While working

full time as Sinclair's senior staff engineer in Denver, Jack returned to Mines to earn a master's degree in petroleum refining engineering and a doctorate in chemical and petroleum refining engineering. In 1972 he formed Process Consultants Inc. and worked as a consulting engineer until he retired in 1994. In addition to consulting, he found time to lecture and teach at universities abroad and in the U.S. Jack's interests included photography and woodworking, and, above all, fly fishing. He was predeceased by his wife of 53 years, Marcine, and his son, Brian. He is survived by his daughters, Ginger Corlew and Susan Mark; two granddaughters; two great-granddaughters; and his brother, William.

EDUARD J. DOUZE '55 of Tulsa, OK, died on April 2, 2008. He was born in 1931 in Indonesia to Dutch nationals who returned to the Netherlands and helped persecuted Jews escape Nazi Germany during World War II. Eduard's family was in turn hunted by Hitler's troops, and when he was seven they fled across the Alps to a boat in Italy that took them to Argentina. He finished high school in Argentina before coming to Mines to earn a degree in geological engineering. After receiving his doctorate in geophysics from Stanford University, he co-founded Aminex, an independent oil company in Dallas, TX. In 1976 he married Susan Everly, whom he met on a beach in Mexico. Eduard was by then a geophysics professor at the University of Tulsa, where he also served as chairman of the Earth Science Department. He and his wife enjoyed hunting for morel mushrooms. He was an enthusiastic contributor to the arts and the Nature Conservancy. Eduard is survived by his wife and two nephews.



JOHN A. FAGNANT '37 of Kemmerer, WY, died on December 25, 2007. Born in Kemmerer, John grew up in the same home where he and his wife would later raise their 10 children. At Mines he earned a degree in metallurgical engineering. He met his wife, Lillian, while working for Allis-Chalmers designing iron ore plants during World War II. They were married in 1943. Shortly after their marriage, he and his wife returned to Kemmerer where he helped with the family lumber yard business and later went to work at Kemmerer Coal Company. A devout Catholic, he attended daily mass until his health prevented it. He was also an original trustee of the Kemmerer Foundation, a member of the Lions Club and served on the Kemmerer City Council. He is survived by his five sons, Paul, Chuck, Steve, Jim and Chris; five daughters, Ruth Fritzel, Marie Julian, Margaret Ann Smith, Billie Richardson and Betty Sanders; 27 grandchildren; and 39 great-grandchildren.



DOUGLAS W. GROBECKER '43, '47 of Claremont, CA, died on January 29, 2008. Born in San Diego, CA, Doug was a retired captain of the U.S. Army and a veteran of World War II. At Mines he was member of Tau Beta Pi and Sigma Gamma Epsilon and earned two professional degrees, the first in mining engineering, the

second in metallurgical engineering. Doug was dedicated to his work in recovery waste management, working tirelessly to develop new sources of energy using recycled waste. He enjoyed traveling, hiking, skiing, biking, flying and gardening. He also took great pleasure in entertaining friends and painting. He participated in Sierra Club outings, hiked in the Himalayas and biked in the Balkans, wherever possible staying in Elderhostels. In 1997 he participated in the California AIDS Ride from San Francisco to Los Angeles in support of research. He asked his family to celebrate his life with a toast, a Frank Sinatra song and a party. He is survived by his companion, Virginia; two daughters, Theresa and Leslie; six grandchildren; five great-grandchildren; and a sister, Betty.



GREGORY A. HAYNES '69 of Colorado Springs, CO, died April 26, 2008. He graduated from Mines with a professional mineral engineering degree—mathematics specialty. Gregory worked for United Technologies Corporation as the senior principle CAD engineer before moving to Aeroflex in Colorado Springs as a software engineer specializing in computer aided design. He was a member of the First Presbyterian Church and remained active with Sister Cities International and Open World. For several years he enjoyed serving as a judge for Senior Design. He is survived by his wife Janet; son, Ethan; and daughter, Hillary Chaney.



KENNETH E. KNAPP '41 of Grand Junction, CO, died on June 16, 2008. Kenneth attended American University before graduating from Mines with a degree in mining engineering. After graduating, he worked for Vanadium Corporation in California and Rifle, CO. In 1942 he married Barbara L. Rountree in Pomona, CA. They subsequently moved to Indiana and Maryland, where Kenneth served nine months in the U.S. Army. He and his wife then moved to Silverton, CO, where he owned and operated two mines. In 1952 he moved to Grand Junction with his family where he remained for 56 years, working for several companies, including Climax Uranium Company, Lucius Pitkin and Bendix. An Eagle Scout as a young boy, he attended the historic 1933 Boy Scout Jamboree in Hungary. As an adult, he enjoyed four-wheeling with the Grand Junction Jeep Club, hiking, rock hunting, bird watching, photography and all manner of science. Kenneth was a devoted member of the First United Methodist Church. He was predeceased by Barbara, his wife of 64 years. He is survived by his son, Charles; daughters, Cheryl Leighton and Nancy Anderson; three grandchildren; and a brother, Robert.

ROBERT J. NEKERVIS '40 of Avila Beach, CA, passed away on February 2, 2008. Robert attended Calumet High School and Michigan Technological University prior to coming to Mines. A member of Kappa Sigma, he earned his degree in metallurgical engineering. Robert went on to work for Houghton County, Michigan Highway Department; Calumet & Hecla Mining Co.; the

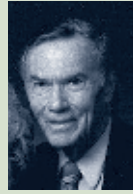
U.S. Postal Service; and the State of Colorado, where he helped survey U.S. Route 50 through the Rocky Mountains. As a scientist, he worked for US Steel in Gary, IN, and was assistant supervisor of the Non-Ferrous Metallurgy Department at Battelle Memorial Institute in Columbus, OH. He was also manager of U.S. operations for the Tin Research Institute of London, later returning to Battelle as a fellow in materials. Some of his projects included the development of stronger materials for railroad and automotive engines, developing protective coatings for bronze castings, and the coordination of U.S. Air Force intelligence on Soviet metals technology. An active member of his community, Robert served as president of the Franklin County Ohio Mental Health Association in the 50s. He retired in 1976. He was predeceased by his wife of 53 years, Genevieve; and his son, George. He is survived by his wife, Dorothy; daughter Robertine Freshwater; three grandchildren; and two great-grandchildren.

RICHARD E. PIERSON '41 of Gainesville and Lewisville, TX, died on February 29, 2008. Richard grew up in Elkview, WV, where he remained until he attended Mines. A member of the Sigma Phi Epsilon fraternity, he graduated with a degree in petroleum engineering and began a 34-year career with Amoco Oil, during which time he developed a formula to maximize profit for refinery processes. In 1975 he joined Wasco as a principal and chief engineer, retiring in 1984. His many hobbies and interests included golf, tennis, model airplanes, electronics, politics, sports, science and the arts. He also documented his family's genealogy in West Virginia. In all the places he lived, he was an active member of Toastmasters, Kiwanis and church choirs. He served the Boy Scout Committee; the United Christian Church in Country Club, IL; the United Methodist Church in Gainesville; and the Men's Golf Association at Lake Kiowa. He also served on the Lake Kiowa volunteer fire department. He was predeceased by his wife, Anna. He is survived by sons, Richard and Brian; daughter, Donna Pierson; step-children, Ann Elliot Gibbs and Lawrence Elliot; seven grandchildren; and three great-grandchildren.



FRANK M. POOL, JR. '70 of Edmond, OK, died on March 4, 2008. Born in Houston, he graduated from San Angelo Central High School before attending Mines. A member of the Beta Theta Pi fraternity, he earned his degree in petroleum engineering. In 1982 he married Valrie Heaton in Odessa, TX. Since

2001, Frank served as the executive vice president of United Engines, an Oklahoma-based distributor of diesel engines. Prior to this, he was the vice president of manufacturing at Stewart & Stevenson. He also served on the scholarship committee of the Association of Energy Service Contractors. Frank is survived by his wife, Valrie; daughter, Lara; his parents, Frank and Elizabeth; and sisters, Mary Ellen Pool Hartje and Martha Pool Elder.



MICHAEL R. "BOB" QUINN '46 of Denver, CO, passed away on October 26, 2008. Born in Denver in 1923, he graduated from Regis High School. In 1946 Mines awarded him two professional degrees: metallurgical engineering and mining engineering. After graduation, Bob attended graduate school at MIT, where he worked on a secret atomic energy

project in the postwar phase of the Manhattan Project, of which "he never gave details." In 1950, while working for the New York engineering firm Dorr Company, he met and married Helen Krippendorf. He returned to Denver in 1961 to work with his brother, James, who founded Denver Equipment Co. In the mid-sixties he joined Hydro Conduit Group, designing concrete pipe systems for the Climax Molybdenum Mine. During his retirement, Bob served as an investment specialist. Bob's love for cars was well known: In the '60s, he owned a fleet of 10 Packards and Chryslers. He also loved children, volunteering as athletic director at Park's Hill Blessed Sacrament School and coaching baseball in the Catholic Youth Recreation Association. He is survived by his wife, Helen; two daughters, Margaret Quinn and Mary Pat Birnesser; four sons, Michael, Peter, Bill and Paul; six grandchildren; seven great-grandchildren; and his brother, James '48.



Joseph W. Reese '60 of Carlsbad, NM, died on February 23, 2008. Born in Stamford, CT, he remained there until coming to Mines in 1956. After graduating with a degree in mining engineering, he went to work on the Alaska-Canadian highway project. Shortly thereafter, he joined the U.S. Navy and was commissioned as an ensign in the Civil

Engineering Corp in 1961. After being stationed in California, he spent a year supervising construction in Saigon in the midst of the Vietnam War. He was then posted to Charleston, SC, where he met and married Mary Freeman, a Navy nurse. In 1965 he left the service, but remained with the reserves. He went on to work for the Bunker Hill Mining Company in Kellogg, ID; Windsor Minerals in Windsor, VT; and a mining equipment division of Voest-Alpine in New Jersey. In 1979 he joined the Waste Isolation Pilot Plant in Albuquerque, NM, and later moved to Carlsbad, NM, where he remained until his retirement in 2002. During his continuing career with the Naval Reserves, he achieved the prestigious rank of captain and served a brief tour as the commanding officer at Carlsbad's Naval Reserve Center. He was predeceased by Mary, his wife of 43 years. He is survived by his son, James.

EDWARD E. RUE MS '49 of Niceville, FL, and formerly Mt. Vernon, IL, passed away on March 12, 2008. Born in Harrisburg, PA, he grew up in Danville, KY, joining the US Navy immediately after graduating high school. He served for three years as a gunnery officer aboard the *USS Clarence L. Evans* during World War II. He married Fay Bright in 1944. After the war he earned an undergraduate degree from Berea College in Kentucky before coming to Mines for a master's in geology. He worked for Magnolia

Also In Memoriam

Michael K. Hendrickson '69.....	March 6, 2008
George W. Hicks '58.....	July 4, 2005
Fillmore S. Peavey '40.....	April 17, 2008
Sidney B. Peyton Jr. '54.....	April 22, 2008
Satyabrata Sarkar '51.....	March 5, 2008
William C. Schafer '49.....	March 31, 2008

Oil Company for four years after graduation and then founded Bufay Oil in Mt. Vernon and embarked on a long and successful career as a consulting geologist. Edward was one of the seven original founders of the American Institute of Professional Geologists, now over 4,800 members strong. He served as AIPG board member and president, and was recognized with honorary membership. Engaged in his community, he was an active member of the Rotary and Elks Clubs, served on his local school board and became an elder in the Presbyterian Church. Edward loved yachting and sailed in the Bahamas for many years with his wife and family. He is survived by Fay, his wife of 63 years; his son, Jonathan; daughters, Fayette Schmultzler and Georganne Williams; seven grandchildren; one great-grandson; and his brother, George.

EARL N. SPIELES '48 of Casper, WY, died on January 1, 2008. Born in Golden, CO, he was raised by his maternal grandparents and graduated from Golden High School in 1939, after captaining the school's undefeated football team of 1938 and earning all-conference honors. That same year Earl began his studies at Mines and played on the undefeated football team of 1939. In 1942 he met his future wife, Irene Ogle, whom he married in Golden in 1943. In 1942 Earl enlisted in the Army Corps of Engineers, serving until 1946 in the China-Burma-India Theatre of World War II. In 1946 he returned to Mines to complete a degree in petroleum engineering. He began his career working in Grass Creek, WY, for the Ohio Oil Company, later to become Marathon Oil. He transferred to Casper in 1953 and was promoted to division engineer in 1960. Active in his community, he coached Little League baseball, was the president of the Casper Babe Ruth League for several years, served on St. Mark's Church vestry and was a board member of the American Petroleum Institute. After his retirement in 1982, he and his wife spent summers in Casper and winters in Mesa, AZ. He enjoyed traveling, all manner of sports, fishing, golfing, attending Army reunions, gardening and, above all, the company of his family. He is survived by Irene, his wife of 64 years; two sons, Patrick and Michael; two daughters, Kathleen Fullerton, Mary Jo Johnson; 10 grandchildren; and 23 great-grandchildren.



ARCHER D. SWANK '60 of Casper, WY, died on March 12, 2008. Born in Dolores, CO, he served aboard the *USS Bremerton* during the Korean War as a machinist mate. Arch earned a degree in geological engineering at Mines, but he never stopped thinking of himself as a student. He took courses in electrical engineering at the University of Alabama, Huntsville while working on the Apollo program, and in his retirement, he continued to take classes at Casper College. During his career, Arch spent 10 years as a system test engineer on nuclear plant design. In 1974 he joined the nuclear raw materials staff of the Tennessee Valley Authority in Casper. After retiring in 1989, he began a computer-assisted mapping business and continued map-making until the week before his death. He was a member of the National Speleological

Society for 43 years and a founding member of the Hole in the Wall Grotto—a local cave club where he helped with vertical training for new cavers. He was also an active member of the Wyoming Geological Association, the state Board of Geologists, SME, the Casper College Geology Club and the Tate Geological Museum. An avid outdoorsman and an accomplished guitarist, he will be remembered for his warm smile, twinkling eyes and quick wit. He is survived by his wife of 44 years, Lynne; daughter, Susan Frazier; and his sister, Karen.



JOE L. THOMPSON '58 of Oklahoma City, OK, died on April 18, 2008. Born in Wichita Falls, TX, he transferred to Mines with a football scholarship from North Texas University. A member of Kappa Sigma fraternity and Blue Key, he married his wife, Jane, in 1957 and graduated with a degree in petroleum engineering the next year. After living in Texas, Kansas, New Mexico and Colorado, they ultimately settled in Oklahoma City in 1966. For six years he worked as a petroleum engineer for Kirkpatrick Oil Company before becoming an independent consultant in 1974. In 1976 he and his wife formed Satellite Well Service Co., which they ran for 20 years. Joe stayed busy in the oil business during his retirement, although he and Jane were able to enjoy their lake house in Fort Gibson. He was an active member of the Oklahoma Independent Petroleum Association, Society of Independent Petroleum Earth Scientists, Society of Petroleum Engineers and the Men's Dinner Club. An elder at the Church of the Savior, he also served on the boards of directors of Hanna Oil & Gas Co. of Fort Smith, AK, and Universal Consulting & Technology, Inc. in Fort Collins, CO and as a section coordinator for the alumni association. Joe was also an accomplished harmonica player. He is survived by Janie, his wife of 51 years; his son, Scott; daughter, Shelly Benson; five grandchildren; and his brother, Richard.



GEORGE P. WALKER III '56 of New Braunfels, TX, passed away on October 3, 2008. A member of the Kappa Sigma fraternity at Mines, he graduated with a degree in petroleum engineering. In 1964 he received a master of science in geological engineering from the University of Texas at Austin. He enjoyed a successful career in the oil and gas industry, which culminated with the founding of Walker Petroleum Consulting in 1980, offering reservoir engineering, computer modeling, exploration and development, groundwater hydrology and remediation. George was a certified petroleum geologist and a registered professional petroleum engineer. Before starting his company, he worked as a district engineer for Tenneco Oil, and then as a division geologist for Amoco Oil. A man who put family first, George was a keen sportsman who loved fishing, hunting and camping. In the summer of 2003, he realized a lifelong dream by exploring the Alaskan wilderness. He is survived by his wife of 53 years, Jeanne; his son, George; daughters, Betsy Walker Gallagher and Charlisa Walker Sisk; eight grandchildren; and two great-grandchildren.

Debate Watch—Two Students Invited to Blog For the New York Times

By Zach Aman and Sara Post

Just one week before the first Presidential debate, the Colorado School of Mines *Oredigger Newspaper* received a call from the Politics Desk at the *New York Times*. The vague phone message left by a veteran editor enticed us to return the call. The *Times* was looking to engage twenty college newspaper editors from around the country in a real-time, online blog during the first Presidential debate. Stunned, we inquired as to why the *Times* was interested in the insights of *The Oredigger*.

“We’re looking for expertise on energy and environment,” said the *Times* editor, and to provide this, we spent the next few days looking into campus research efforts and briefing ourselves on the candidates’ energy and environmental policies.

The actual blogging process was pretty hectic—we sent our posts to a single *Times* editor via instant message, and she was responsible for uploading them to the blog. Unfortunately, this method did not allow the different college editors to converse with each other, and we were essentially limited to commenting on the debate alone. It did, however, force us to consider more carefully what the candidates were saying.

We had a lot of fun with our unique perspective as the only engineering students asked to participate, and chose to focus almost entirely on energy and the environment. When we observed during the final debate that much of the job creation both candidates were calling for would be in the science and engineering fields, and that this could be seen in the “talent crunch” that allowed for the huge placement rates of Mines grads and generous starting salaries, the *Times* editor in charge of uploading told us that we made her feel “awfully stupid for studying political communication.”

Other issues we addressed included energy independence and higher education (focusing especially on science and engineering). A major advantage of having the opportunity to comment on both the first and the last presidential debates was seeing

some questions from the first debate answered in the last. For example, in the first debate we asked, “Our master’s program in nuclear engineering is preparing students to hit the ground running once new nuclear programs are approved by the government; why haven’t the candidates talked about this carbon-free energy source?”; in the last debate, nuclear energy came up. We were fortunate enough to have two physics majors in the room when McCain argued for the establishment of 45 nuclear plants, up and running in 8-10 years. They both pointed out that the timeline for a nuclear plant is 5 years longer, under current regulations, and that “nuclear power wouldn’t even make us energy independent—the U.S. accounts for only 4 percent of the world’s uranium production.”

The conclusion of the first debate left us with the feeling that a monsoon had just passed through; the entire blog session took about three hours and carried the intensity of a physical chemistry final. After we had learned the process, the remaining debates were much less stressful. More importantly, familiarity with the system provided us with an opportunity to explore both energy and environmental policy in greater depth.

One reader commented that our dialogue was among the “wisest and most succinct” she’d ever heard. In retrospect, we are quite pleased by how our worldviews were received, especially given that we were the only students in the “room” *not* majoring in the liberal arts. It was a unique opportunity to bring the engineering approach taught at Mines to a national stage.

The entire blog may be read here: <http://thecaucus.blogs.nytimes.com/2008/09/26/debate-watch-student-view/>

Last Word is a place for alumni and other members of the Mines community to share their opinions and stories. Its content does not necessarily reflect the opinions of the Colorado School of Mines or the alumni association. We have made an attempt to fact check, but readers are advised to independently confirm the veracity of claims made in this and other Last Word articles.



Mark the Spot

Mines magazine ran this photo competition for first time in the fall issue (we called it Recognize This?). The winning respondent was **Sarah Hutson '07**, a chemical engineering major who is now working for Shell in Bellingham, WA. Sarah correctly identified the cast iron grate mounted above the west door of Berthoud Hall—formerly the entrance to the Geology Museum.

Can you identify where this photo was taken? If so, and if you are not currently living, working or studying on campus, send an email to magazine@mines.edu with precise details. Please include “Mark the Spot” in the subject line. A winner, selected at random from all correct answers, will receive a prize and be recognized in the next issue of *Mines*.

At Your Service

Appraisals

ELLIS INTERNATIONAL SERVICES, INC.
Appraisals • Geology • Economics



www.minevaluation.com
TREVOR R. ELLIS '78
Certified Minerals Appraiser
Mineral Economist

600 Gaylord St.
Denver, CO 80206-3717, USA
Phone: (303) 399-4361
Fax: (303) 399-3151
ellis@minevaluation.com

- Property Valuation
- Geology Reports
- Market Studies
- Economic Evaluation

Consultants

Decision Precision®
Training and Assistance in Risk and Economic
Decision Analysis and Project Risk Management

JOHN SCHUYLER CIAM, CMA, CMC,
FE, GCE, CPM, PMP

CSM '72 '77 CU '77
(800) 214-3916
(303) 693-0067
fax: 693-2827

Aurora, Colorado
john@maxvalue.com
http://www.maxvalue.com

DAVID J. DUNN

Metallurgy/Materials Consulting
MET. ENG. CSM 1959



30 Years Industrial Experience Current Passport
French, Spanish

930 Mountain View Dr. (719) 486-0838
Leadville, CO 80461

EARTH SCIENCE SOFTWARE INFORMATION

Gibbs Associates
P.O. Box 706 Phone & Fax: 303-444-6032
Boulder, CO 80306 mining@miningsoftware.com
www.miningsoftware.com

Jensen Technologies LLC
Consulting Chemist-Analytical Lab

Carl M. Jensen Chem '72
www.jensentechnologies.com

15985 S. Golden Road Fire Assay
Unit H Water
Golden, CO 80401 Au
Phone (303) 478-3929 PGM
Fax (303) 248-3498 Metals



Contractors

Howell Construction



550 Lipan St. Denver, CO 80204
(303) 825-6257 • Fax: (303) 899-4786
www.howellconst.com

Bob Howell '39 • Jim Howell '66

Exploration

Kinnickinnick Exploration Inc.
Onshore S. La. Experience
3D & 2D Prospect Generation

Steven S. Anderson, Geop. Eng. '75
133 S. Audubon, Lafayette, LA 70503
337-261-0211 • Fax 337-261-0218

Pearson Exploration Geophysicist
Gravity, Magnetics, Geology
Seismic Interpretation

William C. Pearson, Ph. D.
President

Pearson Technologies, Inc. Phone: 303-989-2014
1801 Broadway, Ste 550 Fax 303-308-0582
Denver, CO 80202
E-Mail: bpearson@pearsontechnologies.com
Website: www.pearsontechnologies.com

MARSHALL C. CROUCH III '67

PRESIDENT-GEOLOGICAL ENGINEER
WHITE EAGLE EXPLORATION, INC.

621 17th Street
Suite 2635
Denver, CO 80293

Office: 303-295-2080
Fax: 303-295-2079
Cell: 303-589-4471
E-mail: mcrouch@whiteagleexploration.com

KiwiEnergy

Mark Gregg
President

markg@kiwienergy.com KiwiEnergy Ltd.
Tel 713.304.9791 5847 San Felipe, Suite 2949
Fax 281-966.1668 Houston, TX 77057 USA

Exploration (continued)



Energy Investments, Inc.

Stephen P. Chamberlain, President
143 Union Blvd., Suite 900
Lakewood, Colorado 80228
303-526-0871 303526-5409 Fax
www.energy-investments.com
energyinv@msn.com

PetroCap
Energy Investors Since 1992

ALEC NEVILLE, Min Ec '82
E&P Project Equity \$5M and Up

2602 McKinney Avenue 214 871 7967
Suite 400 ext 112
Dallas, Texas 75204 aneville@petrocapp.com
www.petrocapp.com



Geotechnical/Environmental Engineering

A.G. Wassenaar Inc.
Geotechnical and Environmental Consultants

DON TAYLOR, P.E., PRES. 1977
BRIAN GLADE, P.E., VICE PRES., 1979

ESTABLISHED IN 1972, WE
ARE A MULTI-DISCIPLINED
CONSULTING ENGINEERING FIRM
IN THE GEOSCIENCE INDUSTRY
SPECIALIZING IN GEOTECHNICAL
ENGINEERING, MATERIALS TESTING,
CONSTRUCTION OBSERVATION AND
ENVIRONMENTAL SERVICES.

2180 S. IVANHOE ST., SUITE 5
DENVER, CO 80222
303-759-8100
877-696-0826
agwassenaar.com

Metallurgical Engineering

FRED R. SCHWARTZBERTG, P.E. '53
JOHN N. SCHWARTZBERG, P.E., '88
Metallurgical Engineers

Rocky Mountain Engineering and Materials Technology, Inc.

An Engineering Consulting Firm:
2432 South Trenton Way, Suite H
Denver, Colorado 80231


(303) 306-0660 Fax: (303) 506-9980
emtec@emtec.com www.emtec.com



At Your Service

Mining

GROSVENOR ENGINEERING COMPANY



David E. Krebs E.M. '66

709 W. Littleton Blvd.
Littleton, Colorado 80120 Mining &
Office: (303) 798-0181 Geological Consultants

Matheson Mining Consultants, Inc.



VIBRATION CONSULTING

- Seismic Monitoring and Modeling
- Liability Protection
- Public Relations
- Regulatory Compliance
- Seismograph Lease and Sales
- Inspections & Damage Claim Investigations
- Blast Design, Seminars...

www.mathesonmining.com

2801 Youngfield St., Ste. 171 Golden, CO 80401-2266
(303) 456-5638 (303) 456-5639 Fax

Natural Resources

NEX GEN

"The Next Generation of Natural Resources."

Charles S. McNeil, P.E.
President

NexGen Resources Corporation Tel. 303/751-9230
3300 S. Parker Road/Fifth Floor Fax 303/751-9210
Aurora, CO 80014 e-mail: cmcneil@nexgen-group.com

Petroleum

SERVIPETROL LTD. 

International Petroleum Consultants
Independent Oil and Gas Producers

ROBERTO AGUILERA
M.Eng. '71, Ph.D. '77

Naturally Fractured Reservoirs
Log Interpretation • Well Test Analysis
Performance Forecasts
Reservoir Modeling
Economics
Petroleum Short Courses

903 – 19th Avenue SW, Suite 502
Calgary, Alberta, Canada T2T 0H8
Tel: (403) 266-2535 Fax: (403) 264-8297
<http://www.servipetrol.com>
email: aguileraservipetrol.com

HALEY ENGINEERING INC.

PETROLEUM CONSULTANTS - DOMESTIC & INTERNATIONAL

5601 SOUTH BROADWAY, SUITE 360
LITTLETON, COLORADO 80121

John D. Haley '48 Phone: 303-795-8578
President FAX: 303-795-5058

Petroleum (continued)

MILLER AND LENTS, LTD.

INTERNATIONAL OIL AND GAS CONSULTANTS

Stephen M. Hamburg
(P.E. '77)

909 Fannin Street, 13th Floor Phone: 713-308-0349
Houston, TX 77010 Fax: 713-654-9914
shamburg@millerandlents.com

Oil & Gas

Explore the Depths of Our Experience.

Consulting Expertise Includes:

Heavy Oil
Gas
CBM-CMM
Oil Sands
Coal
Mature Fields
CO₂ Capture & Sequestration
Enhanced Oil Recovery

NORWEST CORPORATION



www.norwestcorp.com

1010 10th Street • Golden, Colorado 80401
Tel 303.277.1629 • Toll Free 1.866.277.1629

Real Estate

RE/MAX

Robb Pickard
GE '80

Returning to Denver? Moving in Denver?
Why not enjoy the same level of professionalism from
your Realtor® that we learned at Mines?
Call today for the service you deserve!

303-331-4542 robb@robbpickard.com

Search the Denver market at www.robbpickard.com

COLORADO

000 XXX

COLORADO SCHOOL OF MINES

Mines license plate: \$50
303-273-3295

Software

TECHBASE®

Engineering Software

- Database Management
- Maps, Cross Sections & Drill Logs
- Modeling & Statistics
- Open-Pit & Seam Mining
- Interactive 3D Visualization
- And more, all in one software package
- Complete Training, Support & Consulting

Michael Norred '78
P.O. Box 1140, Morrison, CO 80465
www.techbase.com - 303-980-5300

MINE SIGHT

PAST PRESENT FUTURE

An integrated system offering the maximum flexibility and power for geologic modeling, mine planning, and mine evaluation which can be applied to all types of mines (underground, open pit, and strip mines).

MINTEC, inc. employs a professional staff of mining engineers, geologists, and technicians available to provide maintenance, training and technical support for MineSight as well as offering a full array of consulting services to the mining industry.

Mintec

3544 East Ft. Lowell Rd.
Tucson, AZ 85716-1705
Tel: 520.795.3891
Fax: 520.325.2568
E-mail: market@mintec.com
URL: www.mintec.com

Technology Transfer

Dr. Kurt M. Strack
President

KMS Technologies - KJT Enterprises Inc.
6420 Richmond Ave., Suite 610
Houston, Texas 77057, USA

Tel.: 713.532.8144
Fax: 832.204.8418
Res: 281.293.8144

KMS Technologies
An ENDSIGHT company
Kurt@KMSTechnologies.com
www.KMSTechnologies.com

KMS Technologies - Experts in ElectroMagnetics

Technology development	Land acquisition
• Marine	Custom
• Land	Interpretation / Integration
• Borehole	Technology transfer
• Reservoir monitoring	



Stay connected in a whole new way!

www.MinesOnline.net

An online community with great features and benefits.

- Create your personal profile
- Add photo albums and slideshows
- Search the online directory to connect with other alumni
- Access the Alumni Job Center and share your resume
- Get the news you want through RSS feeds
- Link your Facebook or LinkedIn pages
- Sign up for events, volunteer, stay involved!

It's Easy! You're already in the system.

Go to www.MinesOnline.net and click on **First Time Login** (upper right-hand corner). Select your name and then enter your unique **Authenticator ID: the number located above your name on the back cover of this magazine.** Follow the directions and access your CSMAA benefits and other features of the website. Enjoy!

Colorado School of Mines
Alumni Association

P.O. Box 1410
Golden CO 80402-1410

NON-PROFIT
ORGANIZATION

U.S. POSTAGE
PAID
Denver, CO
Permit No. 3280

THURSDAY, APRIL 2, 2009
www.minesonline.net/Edays09

E-Days 'Round the World is 'round the corner in a city near you!

Save the Date for

2009

Join Miners
in your area
as alumni
'round the
world gather
for mixing,
merriment
and to fondly
remember E-Days.

To host E-Days in your city, contact Serena Stickney at serena.stickney@is.mines.edu