

50 years: Mines and the Peace Corps

Newmont CEO shares gold

New frontiers in fracturing

Mines

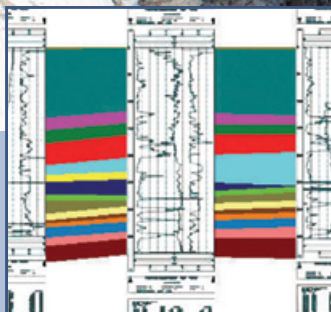
Colorado School of Mines Magazine

Winter 2012 Volume 101 Number 3



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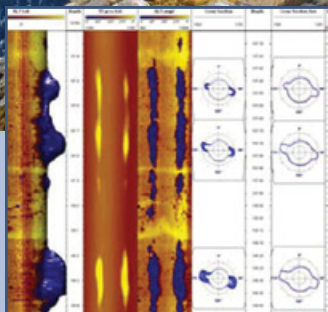


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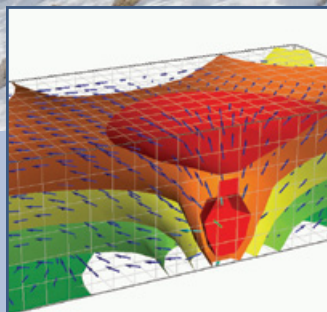


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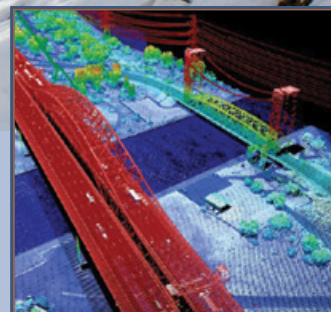


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-  Podcast: Science, Energy and the National Strategic Narrative—Prof. Mark Eberhart
-  A Semester in Abu Dhabi: Three Mines students blog about life at The Petroleum Institute
-  Midyear Degree Convocation: December 16, 2011 (Newmont Mining President and CEO Richard O'Brien's speech starts at 22:07)

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Features

18 Engineering on a Grand Scale with the Smallest of the Small

Mines is helping to put massive armies of microbes to work on some very substantial engineering problems related to energy, materials and the environment. Looking to microbiology for engineering solutions is a growing field with untold potential, but it's not new. After engineering a habitable planet and evolving intricate chemical processes over billions of years, there's plenty of potential to be mined.

26 Half a Century of Outreach: The Peace Corps Turns 50

It's a logical fit: Engineers visit developing countries to help with issues such as water sanitation, aquaculture and construction. But members of the Mines community who served in the Peace Corps agree they came back with much more than they gave. Read some of their stories.

Cover: photography, Shutterstock.com; photo illustration, Craig Korn

Mining Omission

Editor's note: More than one reader pointed out that in the sidebar about the history of George R. Brown Hall on p. 25 of the fall 2011 issue, we inaccurately stated that Brown Hall was originally built "to house the newly established engineering program." In fact, the Department of Mining Engineering—from which George Brown '22 earned his degree—was intended as a major beneficiary of The Brown Foundation's original gift. In 1980, both programs moved into the newly constructed building, which they have shared ever since.

Geothermal Ingenuity

The article on geothermal technology in the fall 2011 issue took me back to my experience in 1979, when I was transferred by Aminoil from the Middle East to the Geysers Field, 60 miles northeast of San Francisco, to manage their geothermal operation there. Aminoil had the contract to supply steam to a Pacific Gas and Electric plant, and although wells had been drilled, startup

and completion of our unit was being held up by regulators, demanding that we reduce the release of minute quantities of hydrogen sulfide in steam vented during emergency shutdowns of the PG&E's plant. The procedure for many years had been to manually shut in the venting wells one by one, which took an hour or so. Regulators decided we had to shut in all wells within just a few minutes.

To have complied manually would require an operator at each well 24 hours/day, seven days/week, which wasn't practical. My solution was to construct a system to operate all the wells from a central control room, from which the entire field operation could be conducted, both solely by the computer and/or a 24-hour/day operator. Although this solved the problem, the project went unnecessarily and considerably over budget.

While I was there, we ended up with three separate geothermal fields. It was a relatively dry steam operation

at 4,000 to 6,000 feet, with the condensate reinjected to replenish the source reservoir. It was a very clean, reasonably sustainable 24-hour/day

operation, and quite profitable. At that time, our first plant was the world's largest—135,000 kilowatt-hours.

I give Mines much of the credit for my very interesting and enjoyable career, which has included domestic exploration geology; running the development program for the largest oil field (Agua Grande) in Brazil; evaluating global projects for Core Lab; managing Aminoil operations in Indonesia, Ecuador, Iran, the Neutral Zone oil fields between Kuwait and Saudi Arabia, and Geyser Fields; and a seven-year stint with Boone Pickens running their acquisitions and divestitures, marketing, and the legal department. The requirements at Mines to think deeply and work hard made me enjoy going to work, which I gather these days is getting harder all the time.

Claude B. Jenkins '52



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Comments and suggestions are welcome. Contact us at magazine@mines.edu; *Mines* magazine, PO Box 1410, Golden, CO 80402; or 303.273.3294. Just need to update your address? Go to minesalumni.com/edit_my_info.

Dear Readers,



The cover design of this issue was partly inspired by a presentation in the Arthur Lakes Library by Associate Professor John Spear MS '94, PhD '99, delivered long after Lisa Marshall wrote the article, "Engineering on a Grand Scale with the Smallest of the Small." If you like Marshall's story, you'll find the talk an entertaining and informative follow-up (downloadable from minesmagazine.com or the iTunes Store, under *Mines* magazine podcast).

To me, listening to Spear is a little like taking a ride on Ms. Frizzle's Magic School Bus. A microbiologist, he describes microscopes as inverted telescopes—windows onto the cosmos of microscopic organisms that make up the greater part of life on earth. Careening through the human body, he challenges basic ideas of self. "I used to

think of 'me' as me," he says, "but now I think of 'me' as a community. I'm a big, complex ecosystem." Elaborating, he explains that many of the microbes that live on and in each one of us (which far outnumber our own cells) aren't just along for the ride. They are vital to health. "Without them," he says, "I wouldn't be alive."

Speaking along similar lines, but shifting to a very different scale, Spear says that many scientists choose to think of the Earth as divided into separate spheres—the lithosphere, the atmosphere, the hydrosphere, the biosphere—but he doesn't. He thinks of it as one thing. "To me, the entire globe is an organism," he says. It's not a new idea, but coming from a practical environmental engineer and scientist like Spear, it's particularly compelling, which is why it came to mind during discussions about the cover.

If the cover design caught your attention, turn to p. 18, where our feature explores the idea that organisms capable of turning a lump of hot, inanimate rock into the vibrant planet we inhabit today probably have more to offer, and not just in the area of environmental engineering. It's an interesting field, and a story we'll keep our eye on for future issues.

Beyond the cover story, there's lots more for you to dig into in this issue: vignettes from the Peace Corps, innovations in hydraulic fracturing technology, advice on leadership from Newmont Mining's CEO (but you'll have to go online to get his predictions for the price of gold), tales of Wild Women, bridge-building in the developing world, and plenty of sporting achievements from the fall season.

I wish we could report more about winter sports, in particular men's basketball. However, as I write this, the #1 ranked Orediggers (29-2 for the season) are preparing for the Central Region Championship game tonight, so it all still hangs in the balance. But no matter the outcome, it'll make a great story for the next issue.

Nick Sutcliffe
Editor and Director of Communications
Colorado School of Mines Alumni Association

P.S. One gem not to be missed is "The Gift of El Tio" by geologist Larry Buchanan '73, PhD '79 and his wife, Karen Gans. You'll find a synopsis on p. 12 and plenty of glowing reviews online. Be warned: It'll keep you up late!

Campus News

Newmont CEO speaks on leadership at Midyear Convocation



"You must act to shape the future you want to see and not wait for the future to shape you," O'Brien said in his address at Mines' Midyear Degree Convocation.

At Midyear Degree Convocation on December 16, 2011, Colorado School of Mines conferred 174 bachelor's, 162 master's and 31 doctoral degrees during ceremonies held in Lockridge Arena. Guest speaker Richard O'Brien, president and CEO of Newmont Mining, spoke on leadership and integrity, invoking recent events such as the Arab spring and the Occupy Wall Street movement to illustrate what happens when leaders lose the confidence of those they represent. "You are more defined by what you do than what you say," he reminded graduating students.

After the ceremony, *Mines* magazine had the opportunity to question O'Brien about his thoughts on leadership and other subjects. Excerpts from this conversation follow (full transcript available online):

***Mines:* You spoke about leadership in your address. How do you characterize your own leadership?**

O'Brien: I'm naturally an introvert, so I'd say my leadership style is more quiet and determined than loud and brash. I tend to set goals and try to meet them. It doesn't mean I can't be an extrovert—in this job you pretty much have to learn how to do that, so I've taught myself.

***Mines:* What qualities do you look for in those you appoint to leadership positions?**

O'Brien: The first thing is, I try to hire people who are smarter than I

am. I want somebody who's got the natural raw intelligence and inquiring attitude to think about and address things differently than I might. Complementary leadership styles are really important. Also, more and more I look for the willingness and the emotional intelligence to be able to figure out how to collaborate with people. It takes more than



Photos: Jolesch Photography





just skills, and it takes more than just honesty and integrity, too; it takes a desire to want to work with others. Most importantly, I look for people who are as committed as I am to company first, team second, individual last.

Mines: Was there a time in your life when you began thinking of yourself as a leader?

O'Brien: I don't tell a lot of people this, but when I was in fifth grade, I went to a Catholic school, and one day a nun pulled me into a cloakroom and said, "There are a lot of children in this class who follow you. You're going to lead them all to hell." Although that wasn't a leadership moment—I mean, who are you leading in fifth grade?—it was something that stuck with me. It got me thinking, and as I went through high school and then into college, I had many occasions to lead. Starting from being on the playground—you know, I'm the team captain and picking sides, and trying to do it responsibly and not make people feel bad—you begin to think, how can I do this better? I examined my life along the way, and when I wasn't leading, I was trying to learn leadership from people who led me.

Mines: Is there a book that has been particularly influential on your approach to leadership?

A book that builds a little bit on what we talked about today is called "Crucial Conversations." It's about taking on those hard conversations with people, and how you can do it in a respectful and an insightful way, and put people in a place where they know what's expected of them. We have a lot of those sorts of conversations—not just with employees, but I sit down with politicians regularly, and those are sometimes difficult conversations.

—Nick Sutcliffe and Amie Chitwood



Read the full transcript at minesmagazine.com, where O'Brien describes his path from law degree to CEO of the number two gold mining company in the world, how he retains balance, what he does to learn something every day, why 30- to 50-year-olds are desperately needed in mining, how he handles the perceived stigma of his industry, and (surprise) his prediction for the price of gold. You can also read O'Brien's commencement speech in Web Extras.

Students Conduct Recon in Nicaragua with Engineers Without Borders

Student clubs are all about building bridges. But in the case of the Mines chapter of Engineers Without Borders, students are literally building bridges. Four members of the Mines chapter made a preliminary foray to the Jinotepe region of Nicaragua over the winter break in support of an upcoming bridge-building project.



Todd Wang (center) describes the history of the El Panama bridge, which was constructed in 2010 by EWB-Rice University and has allowed the community of El Panama safe access to Jinotepe year-round. Left to right: Nathaniel Dauth, Todd Wang, Preston Sutton, Jessica Spone.

During the rainy season, isolated villages there become even more cut off when rivers swell. Suspended bridges, which require relatively little capital to build, can sometimes transform such communities if they permit year-round access to schools, markets, healthcare and other services.

Graduate students Bridget Rossow and Nathaniel Dauth, undergrads Kevin Boxer and Preston Sutton, and professional engineer Todd Wang '86 of CH2M Hill spent a week in the country meeting with local residents and surveying potential bridge sites. Mines' EWB chapter hopes to construct several suspended bridges in the country over the next five years. For more on the project, visit inside.mines.edu/ewb. (Don't miss our profile on Todd Wang, p. 40.)

—David Frossard

New College Named, Dean Appointed

Following discussions with faculty, the Faculty Senate and academic department heads, Colorado School of Mines' first college has been named. Composed of four departments—Mechanical Engineering, Electrical Engineering and Computer Sciences, Civil and Environmental Engineering, and Applied Mathematics and Statistics—the College of Engineering and Computational Sciences also has a new dean: Kevin Moore, G.A. Dobelman Distinguished Chair and professor of engineering. After serving as interim dean since August 2011, Moore was officially named to the position on January 3. In addition, John McCray was named head of the Civil and Environmental Engineering Department after serving in the position on an interim basis during the fall semester.

New Faces

Who's new to campus? Two directors took the helm of their respective programs in 2011. Here's a quick sketch.

Kenneth Osgood

Director of the Guy T. McBride, Jr. Honors Program in Public Affairs and associate professor, LAIS

First day at Mines: July 1, 2011

Hometown: Coronado, CA

Background:

- Florida Atlantic University, associate professor of history and director of the history symposium series
- Stanley Kaplan Visiting Professor of American Foreign Policy at Williams College
- Mary Ball Washington Chair at University College Dublin
- Postdoctoral fellow at The Ohio State University
- Chef, DJ, photographer

Degrees:

- BA in History, University of Notre Dame
- MA and PhD in U.S. diplomatic history, University of California, Santa Barbara

Why McBride: I was first drawn to honors education when I was teaching history at Florida Atlantic University. A call for proposals came out soliciting novel, interdisciplinary courses. It inspired me to propose a new course on the Vietnam War, and prodded me to really develop my own understanding of the war and its consequences. Teaching that course was an inspiration for me, and I loved working with honors students. So when I saw the Mines ad calling for an honors program director, I was intrigued. It seemed to link my passion for honors education with my growing interest in academic leadership. The focus on public affairs was appealing to me, as were the eager and motivated students I encountered when I came here.

Top goal for the McBride Honors Program: Challenge engineers to read, write and think critically.

First website visited each morning: My email.

Best idea yet: Marrying my wife.

Favorite quote: "When the past no longer illuminates the future, the spirit walks in darkness." (Alexis de Tocqueville)

Balancing mechanism: Playing with my two children, and hiking and camping in the mountains.

Most memorable college experience: A course on U.S. history was so riveting that no one cared that the professor continued lecturing, as he inevitably did, for a long time after the class period had ended.

Most humorous comment heard from a student: On a student evaluation: "He makes us work ridiculously hard at critical thinking."

Currently reading: "The Quest: Energy, Security, and the Remaking of the Modern World," by Daniel Yergin; "Making A Real Killing: Rocky Flats and the Nuclear West," by Len Ackland; "Boomerang: Travels in the New Third World," by Michael Lewis.



Christopher Peters

Barry Martin

Director of Special Programs & Continuing Education (SPACE)

First day at Mines: October 3, 2011

Hometown: Melbourne, Australia

Background:

- Regis University, dean of the School of Humanities and Social Sciences in the College for Professional Studies
- Chair of science and health programs at John F. Kennedy University School of Liberal Arts and Education, Pleasant Hill, Calif.

Degrees:

- BS in Applied Chemistry, Chisholm Institute of Technology, Melbourne, Australia
- MBA, John F. Kennedy University School of Management
- MS in Pharmacokinetics, Monash University, Melbourne
- PhD in organic and biochemistry, Monash University

Why SPACE: My personal enthusiasm for triple bottom-line economic models fits well with the school's focus on earth, energy and environment. Also, the role plays to my strengths in business development and relationship building with diverse stakeholders. For me this is a key function and purpose of a university.

Top goals for SPACE: Increasing Mines' presence and influence with the political movers and shakers inside the beltway; developing leadership and management programs for the mining, environmental and engineering industries, to be delivered partially or wholly online; and fostering a faculty academy to support evolving international institutions with a similar mission as Mines.

First website visited each morning: MSN News.

Best idea yet: Most of my good ideas come out of putting the right people together around a problem, so I guess that might be my good idea.

Favorite quote: "There is no abstract art. You must always start with something. Afterward you can remove all traces of reality." (Picasso)

Balancing mechanism: Exercise, running, skiing, golf, tennis, surfing.

Most memorable college experience: I owe a chemistry professor a great debt of gratitude. He encouraged me to believe in myself, to think great thoughts and realize them. My folks were essentially farmers who were grade-school educated, so I certainly wasn't regularly exposed to lofty ambitions or ideals. This man saw something, and that noticing changed my life.

Most humorous comment heard from a student: "If that were really a test, we would've been told where to go and what to do."

Currently reading: "The Innovative University: Changing the DNA of Higher Education from the Inside Out," by Clayton M. Christensen; "The Prize: The Epic Quest for Oil, Money & Power," by Daniel Yergin; "Academic Duty," by Donald Kennedy.



Christopher Peters



There's more from both Osgood and Martin at minesmagazine.com: why they came to Mines, why they work in higher education, favorite spots on campus, and other comments. Click on Inside Mines.

STEM and Sustainability Education Take Lessons from Neuroscience

A group of Mines students and faculty are collaborating with area teachers, college professors and school administrators on a project aimed at enhancing education in STEM (science, technology, engineering and math) fields, particularly as they relate to sustainability and energy.

Initiated in 2010 by members of the Red Rocks Foundation board, which includes former Mines president John Trefny, and funded by a three-year grant from the Community First Foundation, the Red Rocks Institute for Sustainability in Education (RISE) includes partners at Red Rocks Community College, Colorado School of Mines and Jeffco Public Schools.

“RISE is part of a larger vision to effect better teaching and learning by adopting lessons from neuroscience and by incorporating training in entrepreneurship,” says Trefny. “Initially, these efforts are focusing on the existing momentum in Colorado toward a dynamic sustainable technology sector.” Trefny sits on RISE’s Advisory Committee, along with Roel Schneider, the W.M. Keck Distinguished Professor of Basic Exploration Science at Mines. Other Mines faculty involved in the program include Tracy Gardner, Pat Kohl, Junko Munakata Marr, John Persichetti, Jen Schneider, Judith Schoonmaker, Chuck Stone and Sandy Woodson.

In the first 18 months of the program, the Mines team has already contributed toward several key initiatives. In November 2011, graduate students worked on a pilot program with an 8th grade Jeffco science teacher to help integrate a better understanding of energy—the sources, its role in society, environmental consequences and sustainability—into the classroom. RISE’s executive director, Liz Cox, says their work will be used as an example in upcoming workshops on energy literacy being organized by Mines and Jeffco, and it will ultimately contribute toward the development of a certificate in sustainability education for K-12 teachers.

In another initiative, students from Schneider’s Media and the Environment seminar were teamed up with students enrolled in a TV and video production class at Jeffco’s career and technical high school, Warren Tech. Together, the students organized a networking event and shot two videos to explore the creation of



Jeffco students build containers for an aquaponics system in a greenhouse at Warren Tech.

Liz Cox

a Center for Sustainability and STEM Education. “By the end of the semester, students were invested and really stepped up to the plate. ... I tell my students that they have a lot of influence as Mines students—people love their energy, love their experience, and want to learn from them.”

Mines is currently involved in two other programs: A Senior Design team is developing plans to make a greenhouse at Warren Tech net-zero and to include aquaponics—a method of growing crops and fish together in a recirculating system. And throughout the spring semester, several STEM educators from Mines, Red Rocks Community College and Jeffco Public Schools will collaborate by observing each other in the classroom and later share their observations of successful instructional strategies and techniques in a workshop at the end of the semester.

The workshop will weave together the lessons of neuroscience with successful STEM and sustainability education—as is the case in all of RISE’s programs. It’s a multifaceted program with layered objectives. “In multiple ways, the connections I have made and the activities and discussions we have had about sustainability, green engineering, policy, the precepts of ‘Brain Rules’ [by John Medina], and STEM education in general have changed the way I think and act,” says Gardner. “I am better informed about global climate change, more aware of how engineering relates to social justice (and what that even means), and am better prepared now to properly educate future engineers.”

—Amie Chitwood



Watch the video created by students from Warren Tech and Jen Schneider’s class in Web Extras at minesmagazine.com.

In Brief...

Bloomberg Businessweek described Colorado School of Mines as the “biggest bargain” in its recent list of colleges and universities that “pack a return on investment punch.” Businessweek analyzed salary data from PayScale to find schools with below-average tuition rates and above-average return on investment. Mines came in first with a 30-year net return on investment of more than \$1.1 million (\$1.6 million for graduates) and total in-state tuition costs far less than \$100,000. Other schools that made the list include Georgia Tech and UCLA.

The December 8, 2011 issue of Rolling Stone includes a 10-page feature story, “Santiago’s Brain,” on 13-year-old Mines student Santiago Gonzalez. It focuses on his frustrating experience in conventional schools, his life on campus, and the plight of similarly gifted children.

Vincent Harding, confidante and speechwriter for Martin Luther King Jr., participated in a book signing and panel discussion with students on January 19. The event, titled “Martin Luther King: The Inconvenient Hero,” was part of Delta

Days, a weeklong series of events held each year on the week beginning with Martin Luther King Day, and was sponsored by the Hennebach Program in Humanities in collaboration with the Diversity Committee.

Student Activities’ annual Leadership Summit, held on January 28, featured keynote speaker Erik Weißenmayer, the best-selling author, speaker and blind mountain climber who was the first sightless person ever to climb Mount Everest.

Balls Bump up Efficiency of Hydraulic Fracturing

Trillions of cubic feet of natural gas and billions of barrels of oil are now economically recoverable, thanks to advances in hydraulic fracturing technologies, and more enhancements might soon be on the way.

Will Fleckenstein '86, ME '88, PhD '00, an adjunct professor in the Petroleum Engineering Department, is collaborating with the school and entrepreneurs at the Boulder Innovation Center to establish the private company FracOptimal, which will hold an exclusive license to the new technology and take it to market. "We're in the midst of arranging testing and field trials," says Fleckenstein, who has 26 years in the field. "We'll probably have something in the ground in about six months."

Most oil and gas wells drilled in the U.S. today are hydraulically fractured to enhance recovery. The procedure is complex, time consuming and very expensive: A single vertical well is bored down to the hydrocarbon-bearing rock—sometimes as deep as 14,000 feet—before continuing horizontally through the gas- or oil-bearing shale for up to 10,000 feet. Rock surrounding the horizontal portion is fractured in sections, called stages, by sealing off that portion of the borehole and pumping frac fluid (generally a mixture of water, sand and a small quantity of chemicals) at extremely high pressure into the surrounding rock. The idea is to create a network of fractures for the hydrocarbon to escape into the perforated well casing, and then to the surface.

Among other factors, productivity of a completed well is determined by how far a well-developed system of fractures extends from the horizontal borehole, which is primarily a factor of pressure—more pressure results in a larger fracture system. But to keep pressures high, stages must be kept short, and therein lies the problem.

Using current technologies, there's a limit to the number of stages that can be incorporated into a horizontal borehole—the cap is generally about 40. One of the most popular technologies employs sets of balls of different sizes to isolate each stage. As each stage is completed, another ball—one size larger than the last—is injected into the well. When it lodges in a targeted casing, pressure builds up, sliding a sleeve down the casing to reveal openings in the steel. Pressurized frac fluids pass through the openings and into the surrounding shale, fracturing the rock. It's an efficient system, but the number of stages that can be fractured

"Simplicity is the key to a successful technology when you are working at these depths."



Christopher Peters

Will Fleckenstein is combining existing technologies to create a new process that he expects will increase the productivity of natural gas wells.

in any single well is limited by the number of ball and sleeve sizes possible. In addition, balls are often not retrieved, which can limit the well's subsequent productivity.

With patent applications still in process, FracOptimal isn't providing too many details on the technology, but Fleckenstein says they have developed a system that can pack in as many stages as an operator wishes using just the largest ball size. What he isn't detailing is how the apertures, through which balls must pass to reach the targeted casing, are controlled. The one hint he gives: It's a straightforward design, based on existing technology.

"Simplicity is the key to a successful technology when you are working at these depths. Everything has to work every time," he says.

In addition to packing in more stages, another advantage is that the casings don't get smaller downhole, so fluid pressure isn't reduced, and every stage can be fractured with equal pressure. In addition, each ball's location can be sensed from the surface and its movement directed.

What difference does it make? Fleckenstein says even if it's just a few percentage points, it's worthwhile. About two-thirds of new U.S. wells are horizontal and access less than 10 percent of available hydrocarbons in shale plays. "If you're able to increase the productivity of one of these wells by 20 to 50 percent, it has tremendous monetary value," he says. In North Dakota's vast Bakken Field, just 10 percent greater productivity would amount to 50 billion barrels, double the oil recovered from Prudhoe Bay in Alaska.

FracOptimal is exploring several manufacturing and distribution possibilities, including partnering with large service companies that pump fracturing fluids, says Fleckenstein. Adding a technology that can pack in more stages would make all their services more valuable, he says.

—Caroline Schompp



TOGETHER, WE MAKE A DIFFERENCE.

Colorado School of Mines recently received 20 leadership gifts and commitments:

The Adolph Coors Foundation contributed a total of \$225,000 to support the William K. Coors Distinguished Chair in Chemical Engineering and the Herman F. Coors Professorial Chair in Ceramics.

Colorado School of Mines received an **anonymous** contribution of \$811,784 in support of the Colorado Fuel Cell Center.

Chevron contributed \$521,000 to support initiatives through the company's University Partnership Program.

Hershal C. Jr. '58 and **Trudy Ferguson** committed \$100,000 in support of faculty initiatives at Mines.

Jerry '68 and **Tina Grandey** made a \$100,000 commitment in support of Mines' faculty initiatives.

S. Bruce '60 and **Eleanor Heister** gave \$100,000 in support of the Guy T. McBride Jr. Honors Program in Public Affairs.

Hope's Enduring Flame Foundation committed more than \$100,000 to undergraduate scholarships.

Marathon Oil Corporation contributed gifts totaling \$175,000 toward the Marathon Center of Excellence for Reservoir Studies, scholarships and several academic departments.

F. H. Merelli '59 gave \$121,866 to support The Mines Fund and the Petroleum Engineering Department.

Stephen M. Neely contributed mineral gifts to the Colorado School of Mines Geology Museum.

Newmont Mining Corporation contributed \$100,000 toward the Center for Innovation in Earth Resources Science and Engineering (CIERSE).

QEP Resources committed \$150,000 for undergraduate student scholarships.

Randgold Resources made a \$106,854 contribution toward graduate fellowships in the Mining Engineering Department.

A total of \$106,894 from the estate of **John E. Ross** will support the John Eddie Ross Endowed Scholarship Fund.

Mines President **Bill Scoggins** and first lady, **Karen Scoggins**, made a \$200,000 contribution in support of the university.

Shell Oil Company contributed \$100,000 in support of several academic departments and programs.

Charles E. Shultz '61 made a \$250,000 contribution in support of faculty initiatives at Mines.

Bequest distributions of \$175,305 from the estate of **Marian K. Van Kirk** will provide unrestricted support for Mines.

Venoco committed \$195,000 in continuing support for graduate fellowships.

Whiting Petroleum Corporation contributed \$100,000 in support of faculty initiatives at Mines.

Other gifts and commitments of \$25,000 and more:

Anadarko Petroleum Corporation contributed \$25,000 toward the Petroleum Engineering Department.

Apache Corporation contributed \$25,000 in support of the Department of Geology and Geological Engineering.

Aqua-Aerobic Systems, Inc. contributed \$35,000 in continued support for the Advanced Water Technology Center (AQWATEC).

ArcelorMittal contributed \$50,000 to support the Metallurgical and Materials Engineering Department, the Minority Engineering Program and the campus chapter of the Society of Women Engineers.

The ARCS (Achievement Rewards for College Scientists) Foundation contributed \$40,000 toward student scholarships.

Jerome T. '64 and **Rebecca Broussard** contributed \$25,000 to the Broussard Family Engineering and Technology Management Scholarship Fund.

Karl K. Jr. '51 and **Nancy Brown** gave \$26,029 to establish a charitable gift annuity.

Cameco Corporation contributed gifts totaling \$66,536 in support of a graduate student project and geology field camp.

Steve '64 and **Dollie Chesebro** contributed \$35,000 to the Chesebro Athletic Development Fund.

Joe Coors Jr. contributed \$30,000 in support of the golf program.

Marshall C. III '67 and **Jane R. Crouch** contributed \$85,000 in gifts to support the Department of Geology and Geological Engineering, student research and faculty development.

Frederick F. Dueser '49 gave \$25,000 in support of the Dueser Endowed Scholarship Fund and The Mines Fund.

ExxonMobil gave gifts totaling \$33,500 to support several academic departments and the Engineers without Borders student chapter.

The Halliburton Foundation made a \$61,000 contribution to the Minority Engineering Program, geology scholarships, the Halliburton Female Engineers Professional Development Workshop Series and the Making the Connection outreach event for female high school students.

Bequest contributions totaling \$36,199 were made from the estate of **Robert F. Hartman '42**.

Hess Corporation made contributions totaling \$55,000 to support the Department of Petroleum Engineering and the Department of Geophysics.

James E. '67 and **Norine Honea** contributed \$60,000 to establish a charitable remainder trust.

Alfred T. Ireson '48 contributed \$40,500 to the Ireson and Family Endowed Scholarship Fund and The Mines Fund.

Howard E. Janzen '76 gave \$25,000 in support of the university.

Henry C. and Betsey T. Joyner contributed \$25,000 to establish the Charles D. Tyler Memorial Scholarship Fund in honor of Betsey's father, a 1953 Mines alumnus.

Harold M. '68 and **Patricia M. Korell** contributed \$45,000 to the Korell Endowed Scholarship Fund.

Keith A. '52 and **Mary Ann Kvenvolden** gave \$26,000 to establish the George T. Merideth Award for Early Leadership in Geophysical Engineering.

Francis J. '52 and **Mary Labriola** gave \$25,000 to The Mines Fund.

J. Robert Maytag contributed \$25,297 in continuing support for the Andes Graduate Scholarship Fund.

Newfield Exploration Company committed gifts totaling \$57,500 in support of the Petroleum Engineering Department, the Department of Geology and Geological Engineering, and scholarships.

R. Randy Ray '83 made a \$50,000 commitment in support of Mines' faculty initiatives.

A bequest contribution of \$69,742 was received from the estate of **J. Eleanor Schneider** to support the university.

Stephen A. Sonnenberg '81 committed \$50,000 to faculty initiatives at Mines.

Michael R. '83 and **Patricia K. '83 Starzer** contributed \$50,000 in support of The Mines Fund.

Michael S. Stoner '94 contributed \$25,000 to establish the Dr. Billy J. Mitchell American Driller Scholarship Fund.

Joan Stratton '74 donated appreciated securities with a value of \$25,781 to establish a charitable gift annuity.

J. Don Thorson '55 contributed \$50,000 to support the 2012 Leadership Summit.

The Viola Vestal Coulter Foundation contributed \$42,500 in support of the Coulter Chair in Mineral Economics.

James R. Weber '71 provided \$50,000 in continuing support for the Jack R. and Mary D. Weber Endowed Fellowship Fund.

The Williams Foundation committed \$35,800 in support of its 2012 campus engagement plan and E-Days sponsorship.





The Gift of El Tio: A Memoir
Geologist Larry Buchanan '73, PhD '79 and his wife, Karen Gans, coauthored this book about Buchanan's discovery of a massive silver deposit beneath a remote Quechua village in Bolivia. The windfall fulfilled a 400-year-old prophecy that promised a life of wealth for the villagers, but Gans, a specialist in child development, was concerned about displacing the people to open a mine. They moved to the village to witness the change caused by the mining, and learned that the prophecy also had a much darker side that was also fulfilled. (Fuze Publishing, 2010)



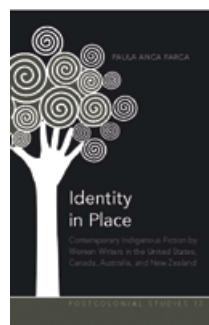
Power and Intellect in the Cold War
McBride Honors Program director Kenneth Osgood's article, "American Propaganda and Psychological Warfare," appears in

the eight-volume series, "Power and Intellect in the Cold War," published in Germany (all titles translated to English), featuring essays by internationally renowned scholars on Cold War history. Osgood's article examines the ways in which advertising, public relations and propaganda affected American foreign policy in the 1940s and 1950s. He shows that influencing foreign and domestic public opinion was a major focal point of intelligence operations, propaganda programs and policy initiatives. In fighting the Cold War, the United States orchestrated a staggering array of operations to influence foreign perceptions and politics. Yet, Osgood suggests, confused and contradictory paradigms for how best to win hearts and minds led to a "schizophrenic" American war of ideas that often created problems for the United States. (Institut für Sozialforschung, 2011)



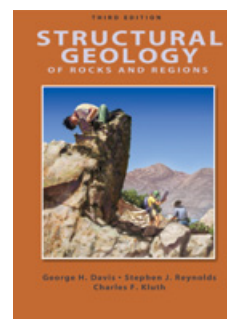
Next-generation Biopolymers: Advanced Functionality and Improved Sustainability
This article, co-authored by Mines professor of chemical and biochemical engineering John Dorgan, highlights some recent advances in bio-based polymers. Complementing

historical biopolymers such as natural rubber and cellulose, these new plastics include a growing number of commercial successes, including polylactides and polyhydroxyalkanoates. Some of the newest developments involve the creation of well-established polymers (polyethylene, polybutylene and polyethylene terephthalate) via new biochemical pathways that start with renewable, rather than fossil, resources. Dorgan is Mines' site director for the Colorado Center for Biorefining and Biofuels. (Materials Research Society, 2011)



Identity in Place: Contemporary Indigenous Fiction by Women Writers in the United States, Canada, Australia, and New Zealand
Paula Anca Farca's book analyzes the role of place and its cultural significance in the fiction of eight contemporary indigenous women writers from the United States, Canada, Australia and New Zealand, four former colonies of the British Empire. Farca, a teaching assistant professor in the Division of Liberal Arts and International Studies, addresses the interaction between indig-

enous people and the locations they inhabited after colonization. She discusses how places reveal the way indigenous people survive in a postcolonial world, heal, regain homes and rituals, and subsequently build new homes and create new traditions. (Peter Lang Publishing, 2011)



Structural Geology of Rocks and Regions, 3rd Ed.
Charles Kluth, distinguished scientist in the Department of Geology and Geological Engineering, is a coauthor of the just-released third edition of this structural geology textbook, an update and expansion of the text authored by George Davis and Stephen Reynolds. The third edition provides an industry perspective on structural geology and tectonics, including discussion of salt tectonics, neotectonics and dipmeter analysis. Filled with photos and illustrations, the book also includes a new chapter on the way faults and folds are related. (John Wiley & Sons, 2011)



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Spotlight STUDENT

Georgianna Zelenak Junior, Geophysical Engineering Harvey Scholar

Her goal is a career in oceanography, so Georgianna (Georgie) Zelenak thought she could use some study time in a setting other than the foothills of Colorado. That's how she ended up in 2010 on Hawaii's Big Island, taking three courses in six weeks in Hilo's Marine Science Summer Program at the University of Hawaii. The deck of a boat was her classroom, and her marine biology laboratory required a snorkel.

Georgie also took Hawaiian 'Ohana, described in the course catalog as "The culture of the Hawaiian people as expressed in the home and family... Both ancient and modern aspects covered; extensive use of Hawaiian terminology." She loved her time in the small town of Hilo, immersed in the culture, learning about the strong family bonds there, and hearing of long-practiced traditions, including some ancient healing techniques.

A Harvey Scholar, her first visit was paid for by her scholarship—Hugh and Michelle Harvey built generous provisions for enrichment into the scholarship they created in 2009—but when



Courtesy Georgianna Zelenak

Zelenak examines a half-eaten collector urchin during a coral disease survey at Wai'opae Tidepools Marine Life Conservation District during her first summer in Hilo, Hawaii.

she returned this past summer, it was at her own expense. As part of a class, the Natural History of Sharks, Rays and Skates, she tagged sharks and monitored their movements in Hilo Bay.

She also studied the health and fitness of Hawaiian green sea turtles. During class one day, her instructors were alerted that a green sea turtle had wandered into a freshwater pond and become stuck. It turned out to be a rare 309-pound female hawksbill turtle, which the researchers and students examined for injuries, measured, tagged and then returned to the open ocean.

Back on campus, Georgie is a member of the school's mine rescue team, and co-captained the first all-women team to compete in an official Mines Emergency Response Development competition at the Edgar Mine last year. During the simulated mine emergency exercise, teams performed first aid, firefighting and underground construction. Up against teams from Pennsylvania State University, the University of Arizona, the University of British Columbia, and the other Mines all-men team, Georgie's team placed second.

She says the experience fine-tuned her communication skills in a situation where communication was a lifeline. She also says she has learned to face her fears head-on. "When I joined the team, I had an intense fear of confined space," she admits. More than anything, though, she says mine rescue has taught her the importance of teamwork and trust, something that is reinforced routinely in her life as a student, a researcher, and in the close associations she's formed with other students in the Harvey Scholars Program.

—Marsha Williams

About Georgie

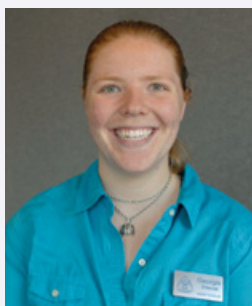
Hometown: Fort Collins, Colo.

Favorite class: Science and Culture

Stress buster: Baking tasty things for everyone I know.

Best study idea: Have an amazing study group to work with! My group and I create Jeopardy games for each other before major exams.

Dream job: Applying geophysics to help locate trapped miners after an incident (or wrestling sharks).





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Scoreboard

Athletics

WOMEN'S SOCCER

Twelve Shutouts, Two All-Americans and the First RMAC Tournament Title

To some observers, the most exciting game of the Mines women's soccer team's seventh season was one in which no goals were scored. A 17-2-4 season ended on November 18, 2011, with a penalty shootout 2-4 loss to the two-time defending champion, Grand Valley State. Still, the game is considered a shutout for the Oredigger women, who had also kept their four previous opponents from scoring and won their last nine games. GVSU had not been shut out in two years.

By the final game, the team of 22 women had climbed from no ranking to #8 in the National Soccer Coaches Association of America / Continental Tire NCAA Division II Women's National Poll. Its final ranking is #5 in the country. Megan Woodworth scored 12 goals this season and tallied 14 assists to become the first NSCAA First Team All-American in program history. Her 3.92 GPA also earned her First Team Academic All-American honors.

Teammate Penny Rogers overcame injury to complete her career with Mines having never lost a game in goal, and was named RMAC Tournament MVP. Anna Evans led the team with 13 goals, earning First Team All-RMAC and All-Region honors. Kelsey Neal helped anchor a defense that posted 12 shutouts as she was named All-American.

Erin Onat notched the game-winner in the 99th minute in the second round of the NCAA Tournament against Minnesota State. Alison "Moose" Oien's only goal of the season gave Mines the RMAC Tournament Championship.

Along with Neal, the team's defense of Aubrey Bagley, Jordan Hopper, and Nicho Cusack, who played nearly every minute of every game, was all but impenetrable, shutting out the then #1-ranked Grand Valley State for the first time in 50 games. And in just his second season at Mines, head coach Kevin Fickes was named the 2011 NSCAA / Mondo Central Region Coach of the Year in early December.

Among its list of team accomplishments are the RMAC Tournament Championship, #1 seed in the Central Region Tournament, the Central Region Title, playing in the NCAA Elite Eight, and nine straight weeks in the top 25. The Mines women held their own in the classroom, too: A cumulative team GPA of 3.24 earned them another NSCAA All-Academic Team Award. Other individual honors included four All-RMAC selections, five All-Region selections, and seven Academic All-RMAC selections.



Doug Hering

The women's soccer team, including Megan Woodworth (pictured, #12), allowed no goals in the tight game against Grand Valley State.

—Katie Simons



Missed any of the games? Watch a video of scoring highlights at minesmagazine.com; click on Scoreboard.

FOOTBALL

Clay Garcia Wins \$18K Postgrad Scholarship as Campbell Trophy finalist

Senior quarterback Clay Garcia was named one of 16 finalists for the William V. Campbell Trophy—the most prestigious academic award in college football—on October 26, 2011. As one of the finalists for the National Scholar-Athlete award, he received an \$18,000 postgraduate scholarship from the National Football Foundation, and attended the NFF Awards Banquet on December 6. Continuing the list of honors, Garcia was named the NCAA Division II Football Academic All-American of the Year and a First Team Academic All-American by Capital One/CoSIDA for the second straight season on December 7.

Currently a graduate student studying material mechanics, Garcia graduated summa cum laude last spring with a 3.91 grade point average in mechanical engineering. He was a regional finalist for the Harlon Hill Trophy this season, after being a finalist for the top Division II Football Athletic Award last year.

—Colin Bonnicksen



Gene Boyars

Clay Garcia receives the NFF and College Hall of Fame's Scholar-Athlete award.

VOLLEYBALL

Mines Upsets #1-seeded Nebraska-Kearney in NCAA Tournament

It took a grueling five sets for the #8-ranked Mines' women's volleyball team to defeat the top-seeded University of Nebraska-Kearney team in the first-round NCAA Tournament on November 17, 2011. "I will never forget the feeling after that match," says Jackie Stabell, who achieved a career-high 29 kills in the game. "It was the biggest win of my career and the biggest win for the program."



Corbey Dorsey

Jackie Stabell (#9) recorded 29 kills in the team's upset victory over UNK.

At the outset, the odds didn't look great for the Orediggers: UNK had played 33 games and only lost one, but that loss was to Mines in September. The Oredigger women won the first two sets,

only to lose the next two. Down 2-0 in the fifth set, Mines scored 10 of the next 13 points, ending the match with a final kill from Stabell, and giving the program its first ever NCAA Tournament win.

Although they lost in the second round to #9-ranked Southwest Minnesota State, their 19-11 season saw huge strides for the program.

FOOTBALL

They Know Us Now

In an ESPN broadcast that followed the January 4 Orange Bowl game, in which West Virginia broke a bowl scoring record in its 70-33 victory over Clemson, the winning coach, Dana Holgorsen, credited Mines football coach Bob Stitt for teaching him the play that The Mountaineers scored with four times. Social media follow-



Joel Bach

ers may have seen the topic trending on Twitter; it also received national media coverage.



Read this at minesmagazine.com in Web Extras for links to the video coverage.



Joel Bach

RUGBY

Leather and Lace

Club sports went formal in the annual Women's Prom Dress Rugby game on October 21, 2011. Entertainment value precluded the need to keep score (none was recorded). Rugby has a long history at Mines; when the men's team was established in 1964, it was one of the only teams in Colorado.



See more photos of the game in Web Extras at minesmagazine.com

COLLEGE RANKINGS

Mines Ranks #5 in Fall Learfield Standings

With the fall sports wrapped up, Colorado School of Mines came in fifth out of 104 schools in the final Division II Learfield Sports Directors' Cup fall standings. The Orediggers got a fifth-place finish from the women's soccer team, a fifth-place finish from the men's cross country squad and a 17th-place finish from the volleyball team during the fall season. Mines finished 18th in last year's final standings and 15th in 2009-2010.

Oredigger News & Notes...

• All-Americans:
Cross Country
Derek Alcorn, Russell Drummond, Sean Gildea

Men's Soccer
Tesho Akindele, Alex Nass, Philip Wilson

Women's Soccer **Kelsey Neal, Megan Woodworth**

Volleyball **Jackie Stabell**

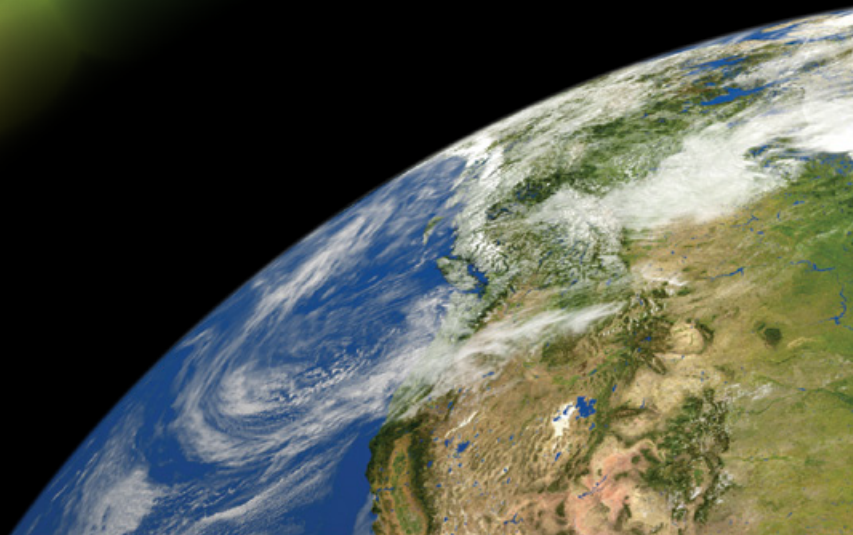
Football **Taylor Accardi**

• Winter sports standings*:
Men's Basketball: 27-2, RMAC tournament title winner
Women's Basketball: 12-17
*as of March 8, 2012

Engineering on a Grand Scale with the Smallest of the Small

Microbial life engineered most of what underpins life on earth, yet it's only recently that engineers have started viewing the world of microbes as a vast and unexplored toolbox of highly efficient chemical processes.

By Lisa Marshall



Microbes living on or in the human body are critical for health. Outnumbering our own cells, we literally couldn't survive without them. The same can be said for microbial life in our natural environment, where clean water and oxygen are just two essentials that come largely courtesy of microorganisms.

Yet, while microbes are such heavy lifters in our natural environment, their role in our built environment is limited.

But that's changing, and various members of the Colorado School of Mines community are contributing to the transformation as they look beyond wastewater treatment—where they have been used for generations—and explore new ways to put microbes to work on biofuels, plastics, gas stimulation, industrial cleanup and even mining.

"Virtually every surface is covered in microbes, and they are all performing some sort of service that we take for granted," says John Spear MS '94, PhD '99, an associate professor of civil and environmental engineering at Mines. "My job is to look at life in any environment and ask, 'Who is there? What are they doing? And how can we use what they are doing to benefit humans?'"

Put a corroded steel pipe or a piece of rotting lumber in front of most people and they see the nuisance impacts of microorganisms; Spear sees a world of opportunity.

Since taking his teaching position at Mines in 2005, Spear has joined a growing number of scientists on campus and beyond who are working to, as he puts it, "connect the dots" between microbiology and mining, metallurgy, and petroleum and chemical engineering. For years a small group of applied scientists have contended that with a better understanding of microbes, we can extract minerals more efficiently, clean up hazardous waste more economically, develop cheaper biofuels and plastics, and much more.

Now, with fuel prices on the rise, a warming planet, and water quality increasingly threatened, more people are listening, funding is more forthcoming and the idea of enlisting microscopic organisms to engineer our world in creative new ways is catching on.

"Microbiology is an extremely exciting field right now," says Spear. "In the next 10 years, it could enable us to solve some really complex problems."

GREEN CRUDE

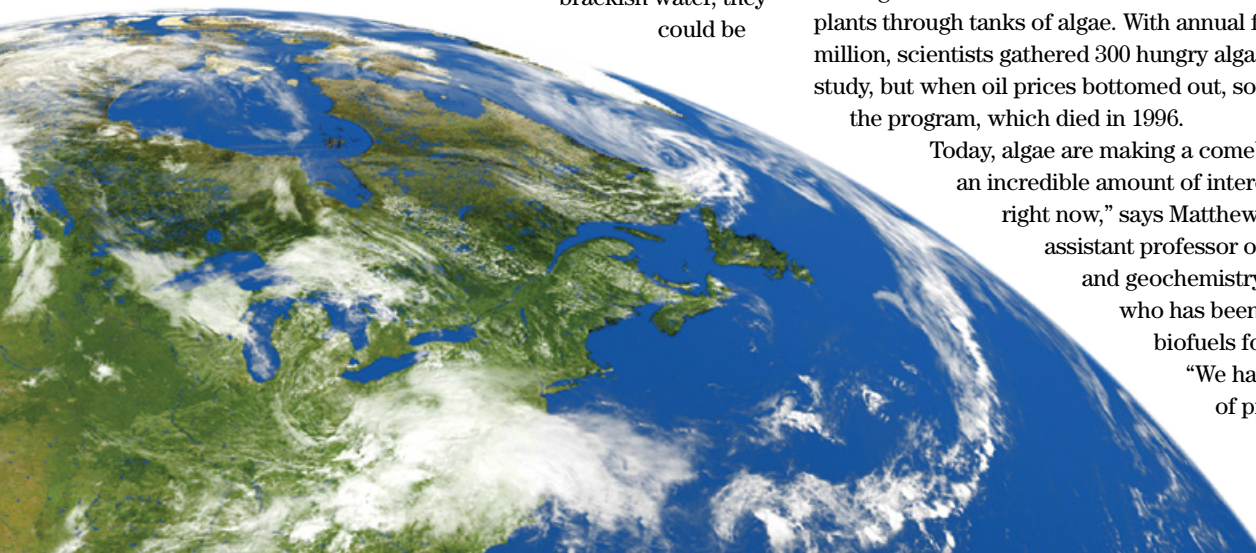
As far back as the 1950s, scientists have studied the potential of cultivating algae as a source of oil. Like tiny floating factories, microalgae use sunlight and carbon dioxide to manufacture fats, which they pack away as a food store. Since they generally grow swiftly (some able to double their weight in just a few hours if conditions are right) and many strains can live in brackish water, they could be

cultivated in environments where they don't compete for water or land with food crops. They're also super-efficient, generating 10 to 30 times more oil per acre than other biofuel oil crops such as soybeans, according to a report by the National Renewable Energy Laboratories.

In 1978, the U.S. Department of Energy launched an ambitious Aquatic Species Program at NREL to explore feeding carbon dioxide emissions from coal-fired power plants through tanks of algae. With annual funding of \$2.75 million, scientists gathered 300 hungry algae strains to study, but when oil prices bottomed out, so did interest in the program, which died in 1996.

Today, algae are making a comeback. "There's an incredible amount of interest in this right now," says Matthew Posewitz, an assistant professor of chemistry and geochemistry at Mines, who has been studying algal biofuels for 12 years.

"We have made a lot of progress in the





Matthew Posewitz and collaborators are working to develop more productive strains of algae for biofuel production.

last few years.” Posewitz points out that most of the oil we pump out of the ground originated from unicellular microorganisms that geological pressure, heat and time have converted into oil. “Essentially, we are trying to do that in real time,” he explains.

A key challenge with algae, Posewitz points out, is that they naturally prefer to make long-chain fatty acids, but short-chain fatty acids work better at lifting a jet or keeping a school bus running in mid-winter temperatures. It can also be exceedingly costly to squeeze the oil out of plump, well-fed algae. (In 1996, according to NREL, the price of oil hit \$20 a barrel, while the price of algal fuel was estimated to be four times that.)

“The big issue has always been that fossil fuel is extremely inexpensive, and it’s hard for biology to compete with that,” Posewitz says, but they are making headway.

With several million dollars in new funding from the U.S. Air Force, the Department of Energy, the National Science Foundation, ConocoPhillips and others, Posewitz and his colleagues have collected more than 150 prolific strains of wild algae in vats that line his lab. Their aim: to develop a strain—either through genetic manipulation or changes in inputs such as food source and sunlight levels—that quickly

stores short-chain lipids and liberates them easily.

In fact, he and two scientists in his lab, post-doc Randor Radakovits and graduate student Robert Jinkerson, just published a paper in *Nature Communications* that lays out a blueprint for a genetically modified alga that splices traits from several other organisms into the species *Nannochloropsis gaditana*, which is naturally a great lipid producer.

“We have a great wild critter and now we are going to make it even better,” says Posewitz, explaining that it not only can thrive in saltwater, but will also produce short-chain fatty acids and isoprenes that are better fuel molecules.

The blueprint is based on their own research and on the work of numerous labs around the world; it’s an uber-alga incorporating qualities cherry-picked from a robust body of knowledge that Posewitz believes is reaching critical mass. “We are at a watershed moment in this field,” he says.

NREL has also revived its algal fuels program and is working with a company called Algenol to expedite commercialization. It could be decades before algal fuels rival fossil fuel in price, Posewitz says, but for those willing to pay a premium for a vehicle that runs on algae-generated biofuel, that option might soon be a lot more available.

GAS FARMING

Meanwhile, Golden-based Luca Technologies (at which Spear serves as scientific advisor) is working on another new “real time” fuel option—one that encourages native microbes, called methanogens, to multiply and gobble underground coal deposits, converting them to methane for use as natural gas.

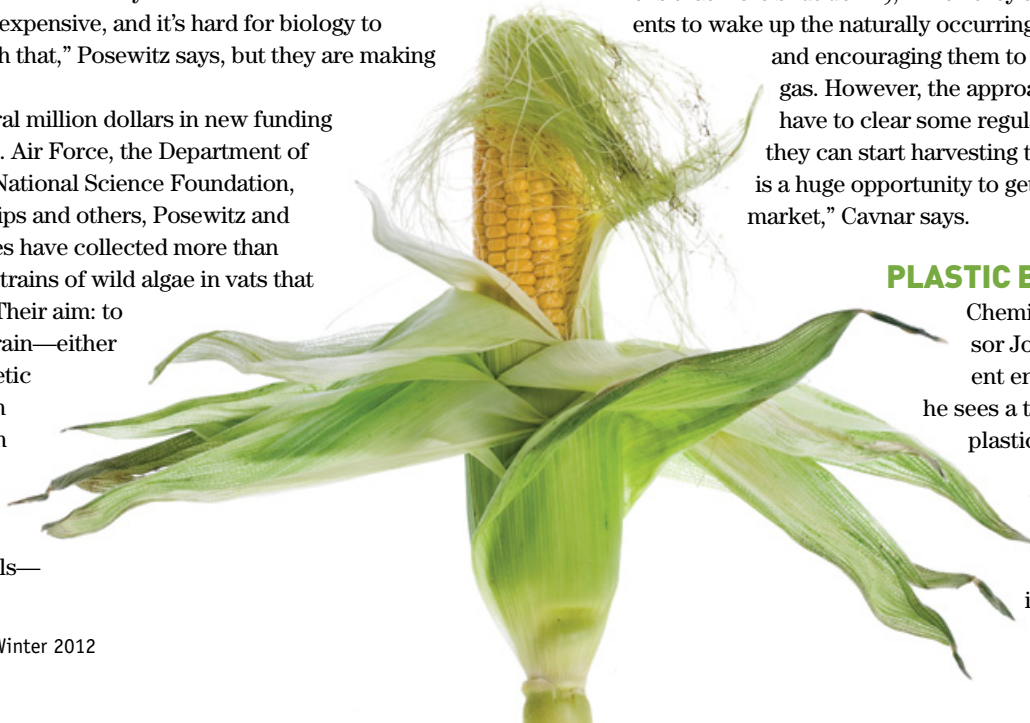
“Traditional oil and gas is more a hunter-gatherer approach,” explains Luca CEO Bob Cavnar, who describes his company as farmers. “We are actually growing gas slowly by reactivating and feeding these methanogens.”

Thus far, the company has purchased about 160 underground deposits in Wyoming (mostly uneconomic coal-bed methane wells that were shut down), which they are infusing with nutrients to wake up the naturally occurring coal-eating microbes and encouraging them to multiply and produce gas. However, the approach is so new that they have to clear some regulatory hurdles before they can start harvesting the gas. “We think this is a huge opportunity to get natural gas into the market,” Cavnar says.

PLASTIC BUGS

Chemical engineering professor John Dorgan has a different end product in mind when he sees a teeming vat of bacteria: plastic.

Since 1993, Dorgan has been pioneering the field of bioplastics, which rely on microorganisms to chew up plant





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sugars, like those in corn, and spit out plastic precursors. “When they are fat and happy, they grow polyester, but when they are lean and stressed, they excrete it and use it as an energy source,” explains Dorgan. Back when he entered the field, few people had heard of bioplastics; today they are widely used in food packaging, plastic utensils and clothing.

Now Dorgan is seeking to improve the manufacturing process by figuring out how to use cellulose from sources like corncobs and stalks to feed bacteria, rather than just relying on edible corn sugars.

“You could redesign our farm harvesting machines and instead of throwing out the non-edible parts of the corn, you could collect them and use them as a valuable source of fermentable sugars for plastic,” he says. “It’s a readily available resource that does not compete with the food supply.”

His research is particularly focused on finding or engineering the appropriate microorganism for the job—one that can chew through intractable cellulose and pack on plastic. Will the day come when our car parts and carpets can be made from bacteria-derived plastic? Absolutely, says Dorgan.

“This field is moving quite rapidly,” he says. “I have no doubt in my mind that within 50 years we will be able to make whatever plastic we want out of renewable resources.”

MICROBES TO THE RESCUE

Microorganisms are also playing an increasingly important role in cleaning up industrial waste.

“Instead of hogging it out of the ground and hauling it off to a landfill, we can treat contamination in place,” says Scott Noland ’87, who graduated from Mines with a degree in chemical

“Instead of...
hauling it off
to a landfill,
we can treat
contamination
in place.”

and petroleum engineering. In 2002 Noland launched Remediation Products Inc., a Golden-based company that populates the pores of activated carbon with 25 species of hydrocarbon-hungry microorganisms for injection into subsurface plumes of petroleum or other pollutants.

For decades, environmental engineers have relied on naturally occurring resident bacteria to help with in-situ cleanup. The problem: It’s hard to generate enough bacteria to spread out and make contact with all the contaminant compounds, so it often takes a long time. Noland says his system delivers a huge

population of just the right bacteria straight to the food source—the hydrocarbon—making short work of the cleanup. “Our product can clean up sites overnight,” claims Noland, recalling a Kentucky gas station owner who spent \$730,000 over eight years on other cleanup measures before hiring RPI. Six months later he received a “no further action needed” declaration from the state, having spent an additional \$180,000.

Hydrocarbons aren’t the only problems microorganisms can tackle.

Based in Highlands Ranch, Colo., ARCADIS has stimulated native microorganisms at hundreds of sites across the United States, South America and Europe to clean up contaminants like hexavalent chromium, chlorinated solvents and explosives.

“The field is evolving as we develop approaches that incorporate hydrogeology, geochemistry, microbiology, engineering and other specialties to more effectively treat a broader array of contaminants,” says ARCADIS scientist Richard Murphy MS ’95, PhD ’00, whose degrees are in environmental science and engineering.

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MINING WITH MICROBES

When it comes to mining, microorganisms have played a critical role for more than a century, since early biohydrometallurgists at the Rio Tinto mines in southwestern Spain first began piling up heaps of low-grade ore and leaving them to biodegrade over years, liberating inherent copper.

In the 1980s Mines graduate James Sharp '61 took this process a step further, exploring the idea of boosting production of specific bacteria at mining sites to hasten the processing of low-grade ore. The idea grew out of his own frustration with a silver-bearing manganese oxide deposit he owned in the mountains of Colorado. It didn't make economic or environmental sense to use leaching processes, which rely on cyanide and other chemicals, but he didn't want to walk away.

"I can vividly remember him coming into the office and throwing around this idea of using bacteria to increase recovery of precious metals," recalls Karen Oden, who worked with Sharp as a graduate student in Arizona in the 1980s. "It was definitely a new idea at the time."

Over the course of three years, Sharp and Oden identified *Bacillus* strains that worked particularly well to break down the manganese lattice and liberate silver. Sharp, who died in 1998, ultimately founded the company MBX Systems, which held six patents and was later sold to other corporations that enhanced the biohydrometallurgical technologies.

“If nature has already done it, why do we need to re-engineer it?”

Today, mining companies across the globe put armies of microorganisms to work liberating valuable metals from ores. “One-third of the copper we produce comes courtesy of three strains of bacteria,” says Harry “Red” Conger ’77, president of the Americas division of Freeport-McMoRan Copper and Gold, the second largest copper producer in the world.

ENGINEERING THE FUTURE WITH MICROBIOLOGY

Ultimately, Spear believes microorganisms will play a much larger role in the engineering of our built environment. In his lab right now, he's working with students on how to remove uranium from contaminated groundwater, turn wastewater into electricity, and prevent microorganisms from degrading underground fuel and sewer pipes. He also continues to look at various ways the extreme biology of microorganisms living in geothermal hot springs can be put to work.

He believes there are plenty more problems that biology can help solve, and he's always on the lookout for opportunities to bring them to light. “With more connectivity, we can solve bigger, more complex problems,” he says. Often, the answers to those problems may be, literally, right before our eyes.

“Life has been around on this planet for about 4 billion years. That is 4 billion years of evolution to optimize processes,” Spear says. “If nature has already done it, why do we need to re-engineer it? We should look for solutions in nature first and capitalize on her processes.” **M**

Grand Prismatic Spring in Yellowstone National Park is the largest hot spring in North America. The spectacular colors of yellows, oranges and browns are the product of photosynthetic pigments contained in trillions of organisms that make up microbial mats around the shores of this and many such hot springs. These organisms, evolved to tolerate extreme temperatures, are more hardy than most and may be more suitable for industrial production of fuel, plastics, enzymes and other biologically derived products.



Anita Parisseau

ALTHOUGH THEY SEARCHED ONLINE FOR DIRECTIONS...



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**COLORADO SCHOOL OF MINES
FOUNDATION**

Half a Century of Outreach:

The Peace Corps Turns 50

An assembly of service-minded individuals from Mines has pledged muscle and mind to countries cooperating with the Peace Corps over the last half-century. As the 50th anniversary of the organization recently passed, we asked some of those volunteers why they went, what they did, and how the experience has influenced their professional and personal journeys.

By Lisa Marshall

At 2 a.m. on October 14, 1960, presidential candidate John F. Kennedy stood on the University of Michigan campus and floated an unexpected idea to the 5,000 students gathered before him: Who would be willing to devote two years of their lives to help people in the developing world have a better existence?

Within weeks, the off-the-cuff challenge had spawned a groundswell of support for a peace-promoting volunteer corps, with thousands of students signing a petition saying not only that they liked the idea, but also that they were ready to enlist. Despite skeptics who called it a “juvenile experiment” and thought it would be a bastion for draft dodgers, Kennedy moved swiftly, signing an executive order 39 days after taking office to establish a “Peace Corps to meet urgent needs for skilled manpower” around the world.

More than 50 years and 200,000 volunteers later, Colorado School of Mines alumni and staff remember not so much what they brought to their host countries, but what they took away.

“Every volunteer will tell you they got more than they gave,” says Mines CCIT information and technology professional David Frossard, who completed two Peace Corps assignments and has done more than 60 presentations touting the rewards. “It is a transformative experience that shakes you out of your narrow worldview and makes you a citizen of the world. It completely changed my life.”

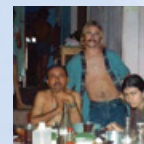
Frossard and three others from the Mines community shared their stories on the following pages.



John Simpson '99
Choluteca, Honduras
Designed and constructed rural water systems.



Robin Simmons '93
Paramaribo, Suriname
Water/sanitation advisor for the Pan American Health Organization.



Mark Patton '70
Amazon, Brazil
Performed marketing research on the export market for tropical fruit products; volunteer coordinator.

Marilyn North
1967-1969

1960s

Mark Patton
1972-1974

1970s

Roger Hutchison
1979-1981

David Frossard
1985-1987

1980s

Jay Straker
1989-1991

Mines alumni and staff have joined more than 200,000 other Peace Corps volunteers on assignments over the last 50 years. Here are a few:



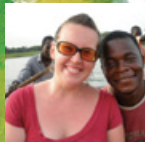
Kathleen Godel-Gengenbach, director, International Programs, Mines

Krakow, Poland
Developed a magazine for allied health care professionals with current articles from worldwide medical journals; taught at the University of Economics, focusing on cultural transitions in a society shifting from a demand to a market economy.



Julia Ventker Ouattara '02, MS '03

Mali
Worked on issues related to water sanitation and education.



Whitney Svoboda '08

Sidéradougou, Burkina Faso
Taught math and English to middle school students.



Jay Straker, associate professor, Mines

The Republic of Guinea
Taught English to high school students and adults.



Jimmy Trask '03

Singida, Tanzania
Taught high school physics, chemistry and math.



David Frossard and Ginny Lee, CCIT, Mines

Zambia
Established freshwater fisheries.

David Frossard, CCIT, Mines

Philippines
Established freshwater fisheries.



Jackson Lee MS '11

Philippines
Worked on water sanitation.



Marilyn North, internal auditor, Mines

Micronesia
Taught English to K-8 students.



Gwendolyn Woods '06

Maewo Island, Vanuatu
Taught teenagers basic business skills and home economics.



Roger Hutchison PhD '89

Botswana
Served as water technician supervisor, installing diesel-powered water pumping systems in villages without clean water.



Each participant listed here has a story about their experience serving in the Peace Corps. Read them at minesmagazine.com under Web Extras.

Kathleen Godel-Gengenbach
1995–1998

1990s

John Simpson
2001–2003

Jimmy Trask
2003–2005

David Frossard/Ginny Lee
2003–2005

Julia Ventker Ouattara
2005–2007

Jackson Lee
2005–2006

Gwendolyn Woods
2006–2008

Whitney Svoboda
2008–2010

2000s

Robin Simmons
2010–present

2010s

Fish farmer to cultural anthropologist

David Frossard was a reporter at a small Colorado newspaper in the 1980s when memories of the idyllic Peace Corps TV ads he had seen as a kid began to pop into his head, luring him to a different life.

"They showed this guy with a woven basket full of fish walking through narrow rice terraces," he recalls. He quit his job, sold his belongings, and signed up, offering to "go anywhere and do anything." As luck would have it, he was assigned to the very location where those ads were shot—helping villagers in the Ifugao Province in the Philippines establish tilapia ponds, improve their water system and build a library.

His experience from 1985 to 1987 opened his eyes not only to the successes of international development work, but also to the unmitigated failures. Determined to better understand what makes the difference, he went to the University of California, Irvine, to earn a PhD in anthropology with a focus on development. That research ultimately led him back to the same village in the Philippines (where he wed Ginny Lee, a Mines computer support specialist, CCIT, in a three-day tribal ceremony complete with pig sacrifices) and on to Mines, where he taught sustainable community development.

Mines students are very good on the technology side, he notes; on the cultural side, sometimes not so much. This makes Peace Corps an ideal fit for Mines grads, he argues. They have valuable skills to offer and it complements their education well.

By 2003, the pull of the Peace Corps set in again for Frossard, and the couple applied. Their assignment: aquaculture in Zambia. "I was vastly less naïve this time around," Frossard says. "We tried not to do for them, but with them."



During their two years in northwest Zambia, they lived in a mud hut crafted from abandoned termite mounds and rode their mountain bikes as much as 100 miles round-trip to visit surrounding villages. They worked with farmers in dozens of communities, teaching them how to dig tilapia ponds, incorporate them into their existing farms (using garden waste as fish food and pond muck as vegetable fertilizer), and market them. "It was a relatively new activity that didn't have gender assigned to it, so the whole family could be a part of it," says Lee.

It also enabled residents to boost their income exponentially. "When one of our farmers harvested 80 kg of fish from one fish pond, he tripled his annual income in one day," Frossard says, adding that now this same farmer has nine ponds.



Lasting impact, 50 years later

Mines internal auditor Marilyn North was still in high school when Kennedy unveiled the Peace Corps in a televised speech.

She knew immediately it was what she wanted to do. In June 1967, she graduated from Colorado State University with a degree in history and French. Two months later, at the age of 22, she moved to the tiny island of Moch in Micronesia, a half-mile long, one-quarter-mile wide and a population of 500. After learning the island language of



Mortlockese, she settled into a wooden, two-room house on stilts and set out to—as she puts it—"save the world."

"For the first six months, I thought I knew how everything should be, but then I realized, 'these people are doing just fine,'" she recalls. "They just wanted to learn English." During her two years in Micronesia, she taught English to roughly 150 K-8 children, who had rarely encountered a Westerner.

Now 66, her career may have shifted to an entirely different field, but she says her experience of living contentedly with less has served her well, both personally and professionally. "I am always looking at operational efficiencies," she says.

Her advice for Mines grads considering joining up? Go for it.

"The Mines experience provides students with incredible skills," North asserts. "Combine that with the Peace Corps experience, and you can really offer the world a wonderful gift."



A new identity

When Julia Ventker Ouattara '02, MS '03 first stepped foot on the West African soil of Mali in 2005, it was the watershed that would lead to a new identity, a husband and a changed view of what “quality of life” means.

“The quality of life in Mali, as defined by aid organizations, is not very high, but early on I sensed a lot more happiness there than I did here,” says Ouattara, who joined the Peace Corps after graduating with a master’s degree in environmental science and engineering from Mines, and working a brief, unfulfilling stint as a consultant.

Once she arrived in the rural village of Missirikoro as a water sanitation volunteer, she spoke only the local language of Bambara, changed her name to Yiritio, or “tree woman” (a name given to her by her host family), and immersed herself in the culture. “I wanted to live like they lived and really try to understand their lives,” she says. “That’s the point of the Peace Corps. It is not to go in and impart all this knowledge that no one can relate to. It is to go in and learn what they need and will actually use after you are gone.”



The region was rife with waterborne diseases and malnutrition, with 42 percent of children dying before the age of 5. The drinking wells had no covers and often became fouled with dirt and even dead animals. Babies survived on only flour and water. Armed with a self-starter mentality she attributes to her Mines education, she got to work helping villagers design and build 15 concrete well aprons and trap doors to keep out pollutants. She also started an infant nutrition program and launched a science-based radio broadcast.

On December 26, 2006, Julia married her neighbor, Yaya Ouattara, before 100 “surprised, but mostly accepting” villagers, including Yaya’s 17 siblings. After staying a third year to teach preschool, she returned to Colorado with her husband, had a son (now 2) and decided to go back to school. Her goal now: to teach high school chemistry.

“The Peace Corps taught me how much I love teaching and how important family is to me,” she says. “I love science, but I can’t go back to those cubicle walls and long hours.”



A two-for-one deal

For John Simpson '99, whose degree is in civil engineering, the Peace Corps presented an opportunity to simultaneously quench his wanderlust and get a master’s degree. As an early participant in the Peace Corps Master’s International program, he was able to attend Michigan Technological University (the only university to offer the program at the time) for one year of technical training and social anthropology, and then spend two years in Honduras. Today, more than 80 universities participate in the program.

Simpson’s assignment plucked him from his small town of Durango, Colo., and took him to the sweltering metropolis of Choluteca, Honduras, where—unlike typical rural Peace Corps assignments—he had an apartment with air conditioning and cable TV to come home to at night. During the days, he would ride the bus or hitchhike into villages, offering his hydrology expertise to well-intentioned international aid volunteers who lacked an engineering background.



“Sometimes people in other fields who go into the Peace Corps end up doing projects that the public hasn’t really bought into. But if you are an engineer doing a technical project, you can go in and be highly effective, helping with projects that they really want,” he says. “I think they need engineers more than

any other profession.” In all, he worked on 30 projects, from minor repairs to entire systems. By far the greatest challenge was transporting construction material into rugged, mountainous building sites with no road access.

On one six-month water system project, village kids loaded buckets with sand and gravel from the river and carried them to the top of a hill to mix concrete for a water tank. Then the whole community pitched in to dig a 2-mile trench and install pipes to feed new taps in 150 homes. “To stand outside with some of the old-timers who had been there 60 years and see how happy they were when they turned on that water—it was really rewarding,” Simpson recalls.

He walked away not only with a degree and a shot at a good government job, but also fluent in Spanish and a new sense of ingenuity. He now works as a civil engineer for the U.S. Fish and Wildlife Service.

“Things are not going to be exactly what you think when you are out in the field, and sometimes you just have to go with the flow and make it work,” he says, crediting the Peace Corps for teaching him how. “You will not get an experience like this immediately out of college anywhere else.” 

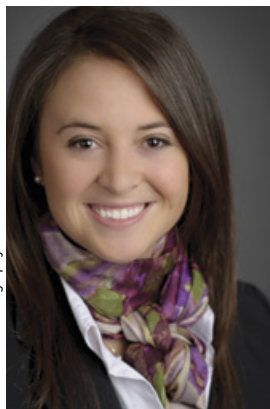
The Network

Mines Welcomes Home Alumnae

For the first time, Alumni Weekend (April 26–28) includes a reunion for all women graduates of Mines— an event that could be the largest campus reunion ever.

To celebrate the tenacity and success of the school's women graduates, the alumni association is inviting all "Women of Mines" back to campus for Alumni Weekend 2012, which will include a series of special opportunities for attendees to hear about the strategies for lifelong success employed by others, and to share their own.

"Mines was instrumental in allowing me to achieve professionally," says Terry Fox '89, who is a judge on the Colorado Court of Appeals and a member of the planning committee. "I consider it my responsibility to help other Mines women—graduates and students—by sharing my professional and personal experiences. The Women of Mines component of Alumni Weekend is the ideal venue in which to share."



Yvonne Min Photography

"I am fairly certain that, given a cape and a nice tiara, I could save the world."

—Michelle Moorman
'05, Women of Mines
planning committee

Women represent a remarkably loyal and cohesive portion of the Mines community. The school's student chapter of the Society of Women Engineers is the largest in the country and the largest student organization on campus, women remain engaged with the school and alumni association long after graduation, and the bonds they form on campus are particularly deep and long-lasting—for a great example, see the "Wild Women" profile (pp. 36–37).

In addition to activities designed specifically for female graduates, participants in Alumni Weekend will have the opportunity to rediscover Mines through a series of special seminars and tours, including a hard-hat tour of the new petroleum building, Marquez Hall. At the annual Celebration of Alumni event, alumni and past Mines Medalists and Distinguished Achievement Award recipients are invited to honor this year's recipients, as well as the graduating class.

Other groups celebrating a reunion this April are the classes of '35–'61 (Golden Miners), Class of '52 (60th), Class of '62 (50th), Class of '67 (45th), Class of '72 (40th), and graduates of the Department of Chemical and Biological Engineering, which is marking its 60th anniversary.

For more information about Alumni Weekend events and to register, visit minesalumniweekend.com.

Five Tips for Getting Hooked Up to LinkedIn



LinkedIn guru Kevin Knebl spoke about how to integrate careers with social media during a webcasted campus event on November 21 that was sponsored by CSMAA. Here are some strategies he shared:

1. **Build a robust profile, using keywords to maximize search functionality.**
2. **Join groups that relate to your knowledge base and look for questions to answer.**
3. **Recommendations on LinkedIn are powerful; solicit them from those you've worked with.**
4. **Devote 10 minutes each day to LinkedIn.**
5. **Social media is 5 percent technology and 95 percent personal relationships. Never miss an opportunity to make something personal.**

Dues-paying members of the alumni association can access a full recording of the 3-hour event at minesalumni.com/knebl.

Life Members

The Colorado School of Mines Alumni Association gratefully acknowledges its new Life Members, welcomed between February 1, 2011, and December 31, 2011.

Travis S. Arciaga '08
Ben M. Bayer '99
Gail Vogt Bebee '83
Justin J. Beougher '09
Kent B. Bradford '91
Monika '81 and Philip E. '81 Brinkmann
Peter D. Bucknam MS '01
Marilou A. Canon '10
Robert D. Carlson '96
Caryn J. '08 and Bryan M. '07 Carruthers
Hsi-Yuan Shawn Chen '00
Jarrod R. '00 Clark and Jessica L. Lolley '01
Craig B. Clemmens '71
Robert M. Connolly '04
Michael J. Dammann '88
Thomas V. Demars Jr. '76
Mandi R. '06 and Richard M. '07 Diaz
Ustun Duman PhD '09
Michelle S. Dunbar '90

Mark D. Eisbrenner II '02
Christopher L. Eklund '09 and Sara Eickelman '09
W. Durand Eppler MS '77
Sean P. Fahey '08 and Rachel M. Nii '08
Walter S. Fees IV '11
Gregory S. Floerke '86
Christina L. '98 and Travis J. '98 Flowers
Stephen C. Freeman '81
David S. Ginley '72
Brian D. Glater '05
Jessica C. Grainger '10
Gerald W. Grandey '68
Mary C. Griggs MS '93
Daniel J. Grunwald '99
Michael J. Harrington '01
Andrea T. Hart '77
Brian L. Haverland '95
Stephen L. Hillis '79
Steven M. Jaccard '74
John D. Jensen '91

Kendra L. Johnson (current student)
David J. Kalman '92
Devin A.J. Karns '06, MS '09
Zachary J. Kimball '06
Cary E. Kinross-Wright '94
Constance N. PhD '99, '00 and Roger E. Knight '70
Jolene K. Kramer '83
Joshua M. Lau '08, MS '10
Patricia Leathers '08
Christopher M. Leone '94
Diana H. Lockyer '99
Kristine A. Lombardi (current student)
Timothy J. MacIntyre MS '06
Reed M. Marquand '00
Donna R. Messer '73
Victor J. Miller '73
Jason A. Mills '98
Glen J. Mizenko '85 and Clara Putzig-Mizenko '85
Anthony J. Montalvo '10

Eduardo J. Morillo MS '02
James M. Mosby '04
Balazs Nagy MS '98
Ralph R. Newman '70
Juley A. Nugent '86
Russell R. Opfer '77
Jeffrey S. Parham '09
Steven W. Patton '80
Richard D. Peters '80
Dennis A. Pieters '79, MS '92, PhD '03
Neal T. Porter MS '08
Bonnie E. '04 and Russell A. '04 Powell
Zane T. Prickett '03
Sean M. Reed '10
Jason K. Reicheneker '97
John H. Rheinheimer '89
Aaron N. Rich '04
Joshua S. Rogers '03
Jean M. Romersheuser '07, MS '08
T. Quinn Roussel '97

Andria L. '06 and Andrew P. '05 Schmid
Stephen D. Schwochow '70, MS '72
John D. Simpson '59
Luz C. '05, MS '09 and Tylor J. '04, MS '07 Slaughter
Jennifer G. Smith '02
Wendi F. Smith '90
Daniel K. '07 Steele and Katherine Muterspaugh '07
John M. Stermole MS '84
Daniel B. Stouffer '02
Spring A. Stutzman '98
Jafar Tabaian '00 and Lauren H. Bock '02
Edwin Dale Thompson '71
Natalie C.T. Van Tyne MS '92
Nicholas E. White '90, MS '95 and Patricia T. Green '91, MS '94
Tonya L. Wyatt '97

To join this exclusive group of more than 970 Life Members of the Colorado School of Mines Alumni Association, go to minesalumni.com and click on "Join Now."

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Fast Forward

Class Notes Weddings Alumni Profiles Passings

1962

Rand L. Watson is a professor emeritus of chemistry for Texas A&M University and lives in College Station, TX.

1963

Robert D. Coale is the president, CEO and board member of Tuffnell and lives in Solana Beach, CA.

Martin C. Kuhn is a senior principal for Minerals Advisory Group and lives in Tucson, AZ.

1964

Donald Bingham 📷

1965

C. Jefferson Babcock is the chairman of Vistage International and lives in Hampshire, IL.

Barry Quackenbush lives on BDQ Ranch in Okmulgee County, OK.

1966

Ronald W. Marrs is the president and exploration manager of Optionor and lives in Laramie, WY.

Donald E. Vandenberg is working for BLS Energy and lives in Kingwood, TX.

Roger H. Witte is a VP of sales for Tulsa Combustion and lives in Owasso, OK.

1967

Jaime N. Gaona is a director and chairman of the evaluation and reserves committee for La Cortez Energy based in Bogota, Colombia.

1968

Roger W. Derby is working for Roan State Community College and lives in Oak Ridge, TN.

Gerald W. Grandey is a director for Sandspring Resources.

C.M. Holmgren is a lead reservoir engineer for Gaffney, Cline & Associates and lives in Katy, TX.

Bruce R. Palmer is a senior professor, chemical engineering program, for Texas A&M and lives in Arvada, CO.

Robert A. Reseigh is working for Comstock Mining and lives in Bozeman, MT.

Richard A. Weaver is a reservoir engineer consultant and lives in Newport Beach, CA.

1969

George W. Quinn is a recharge manager for the state of Idaho and lives in Boise, ID.

1970

Larry Cramer 📷

Richard J. Kehmeier is a chief geologist for Pincock, Allen & Holt and lives in Conifer, CO.

Terry J. Laverty is a principal for T Laverty Consulting and lives in Golden, CO.

Kjell Lovold 📷

Charles Miller 📷

James A. Miller is a senior principal for GeoEngineers and lives in Bothell, WA.

Lee E. Swartling is a VP, sales and marketing, for Wagstaff and lives in Liberty Lake, WA.

1971

P. Charles Beck is a program coordinator for Red Rocks Community College and lives in Arvada, CO.

Robert D. May Jr. is a geologist for Oxbow Mining and lives in Bluefield, WV.

1972

C. Romaine Gerould is an enablement coordinator for ConocoPhillips and lives in Wichita, KS.

1973

David W. Hawkins is a general partner for Hawkins & Hawkins and lives in Boynton, OK.

Dennis M. Kerstiens is a technical coordinator for Sandspring Resources and lives in Windsor, CO.

Victor J. Miller is a consulting engineer for Newmont Mining and lives in Winnemucca, NV.

Randall J. Scott is the president and CEO of Rare Element Resources and lives in Littleton, CO.

1974

Ricardo M. Campoy is a managing director for Headwaters Merchant Bank and lives in Larchmont, NY.

James P. Geyer is the president of Paris Hills Agricom and lives in Spokane, WA.

Benjamin W. Guenther is an SVP North America and Americas technical for AngloGold Ashanti and lives in Centennial, CO.

Kim C. Harden is a production program manager for Simbol Materials and lives in Spring, TX.

Thomas R. Kelly is the CEO of Apurimac Ferrum based in San Isidro, Lima, Peru.

Richard P. Mignogna is a PE and senior authority on renewable and alternative energy for Colorado Public Utilities Commission and lives in Golden, CO. 📷

1975

David W. Ash is a technical support specialist for Avaya Government Solutions and lives in Fairfax, VA.

Weddings



Missy Engbarth '05 and **Casey Birkholz** married on August 12, 2011, in Island Park, Idaho. Mines professor **Alexandra Newman** attended.



Christine White '05 and **William Ciro** were married on April 9, 2010, in Houston, Texas, joined by five alumni.

Mandi Stewart '06 and **Richard Diaz '07** married on August 20, 2011, at Green Gables Country Club in Lakewood, Colo., in front of 75 alumni, 16 of whom were in the wedding party.



Nathaniel E. Putzig '86 and **Lauren N. Giebler** married on May 7, 2011, at the Foothills Chapel in Golden. A professor, one student and six alumni attended.



Brian Glater '05 and **Sarah Ftaya** were married August 21, 2011, at The Teahouse in Stanley Park, Vancouver, British Columbia. Three alumni attended, including Brian's grandfather, **Bill Glater '51**, and father, **David Glater '77**.



Shelby Hollmaier '10 and **Chase Ruff '08** were married on October 22, 2011, in Fort Morgan, Colo. Three alumni attended the ceremony.



Catryn E. Wilson '04 married **Eric M. Becker** on June 1, 2011, in Vivaro, Italy. **Jessica (Neumiller) Barhaug '04**, MS '06 was a bridesmaid.



Catherine Tolliver '06 married **Matthew Alaniz** on September 4, 2011, in Pine, Colo. They were joined by five alumni, including Catherine's father, **Michael Tolliver '78**.



Chip Karo '03 and **Emily Williams** were married at Lake Lanier Islands in Buford, GA, on May 14, 2011, in front of a group that included 12 alumni.



Jacob Benson '01 married **Kelly Motz** in Breckenridge, Colo., on June 4, 2011. A professor and six alumni attended, including Jacob's father, **Bob Benson '76**, MS '84, PhD '97.

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

Michael G. Leidich is the COO of Aldershot Resources and lives in Golden, CO.

Robert P. Magnifico is a deputy program manager for Metropolitan Transportation Authority and lives in Newtown, PA.

James R. Perry is a senior specialist engineer for DM Petroleum Operations and lives in Lumberton, TX.

Paul J. Shattuck is a project manager-senior mining engineer for Tetra Tech and lives in Highlands Ranch, CO.

Thomas M. Wolke is a senior process engineer for Materion and lives in Toledo, OH.

1976

Gregory L. Brown is an exploration geophysicist for Apache and lives in Sugar Land, TX.

James P. Daniel is a VP, general manager for McDonald Group and lives in Marietta, GA.

Douglas L. Jeffries retired from Chevron in April 2011 as chief fire protection engineer.

Alumni

Fast Forward

Gary Nilson 📷

1977

Douglas M. Ginley is an engineering supervisor for the U.S. Department of the Interior and lives in Boulder, CO.

Deborah R. Miles is a geophysicist for New MK Enterprises and lives in Boulder, CO.

Jeff O'Kelley is an explorationist for Bluestreak Exploration Group and lives in Spring, TX.

Kevin Wayne Patterson is a construction facilities advisor for Chevron and lives in Bakersfield, CA.

Robert Z. Smith is working for Innerquest and lives in Dowagiac, MI.

Wayne Zeornes 📷

1978

John H. Benton is a VP and general manager, exploration and production, for Black Hills and lives in Littleton, CO.

Mark A. DePuy is an SVP of business development and acquisitions for Venoco and lives in Englewood, CO.

Gerald C. Gilmore is a VP, exploration, for Penn Virginia and lives in Houston, TX.

John P. Griffith Jr. is a director of portfolio management, fuel/emissions, for Duke Energy and lives in Charlotte, NC.

William Hering is an operations manager—San Juan for Samson Resources and lives in Wheat Ridge, CO.

Richard A. Ruggiero is working for Baker Hughes and lives in Houston, TX.

In Fond and Caring Memory

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in engineering drawing
and in life as well.**

—The Bisque family

Mick R. Will is an operations consultant and lives in Katy, TX.

Shelley J. Skopinski Wolf is a senior process engineer for Wise Alloys and lives in Muscle Shoals, AL.

1979

Roe C. Arn is a manager remuneration and systems for BHP Billiton and lives in La Plata, NM.

David L. Bartel is a VP of investments for SouthGobi and lives in Aurora, CO.

David A. Bird is a general manager—Rockies/midcontinent for Microseismic and lives in Englewood, CO.

Peter A. Drobeck is a VP exploration for Aurico Gold and lives in Golden, CO.

Mark D. Geib is a principal engineer for EchoStar Technologies and lives in Cheyenne, WY.

John F. Gnazzo is a senior software engineer for American TeleCare and lives in Eden Prairie, MN.

Steven A. Jensen is the president of Crestone Seismic Software and lives in Littleton, CO.

William J. Knight is an analyst for Universal Personnel and lives in Mobile, AL.

Andrew J. O'Connor is a director for BMO Harris Nesbitt and lives in Irvington, NY.

Dennis A. Pieters is a senior staff reservoir engineer for Citation Oil & Gas and lives in Katy, TX.

Ronald W. Scrivner is working for Stress Engineering Services and lives in Houston, TX.

Russell W. Truby is working for Callon Petroleum and lives in Katy, TX.

1980

Timothy B. Arnold is a lead instructor for Murchison Drilling Schools and lives in Los Ranchos, NM.

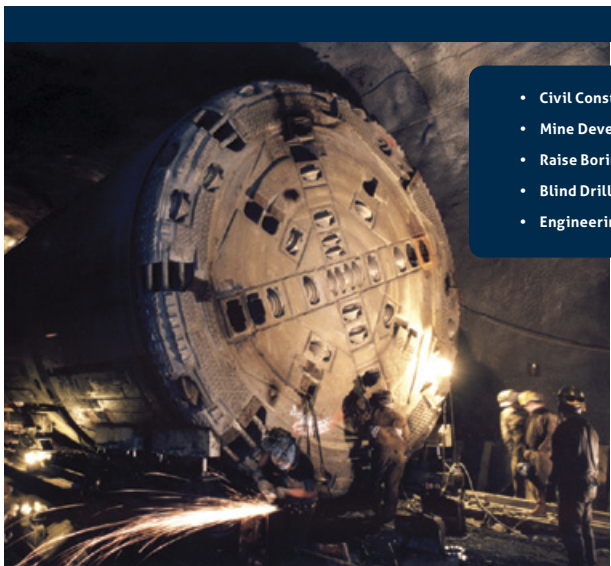
Theodore DePooter is a lead associate for Jacobs Associates in Kennesaw, GA.

Javaid A. Durrani is a manager for RSI and lives in Houston, TX.

Michael R. Fink is a manager, new programs and integration for Northrop Grumman and lives in Colorado Springs, CO.

Fred Gatton Jr. is a senior software architect for Critigen and lives in Land O' Lakes, FL.

John H. Gould is a senior manager, product tech support for Baker Hughes and lives in Midland, TX.



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Walter H. Hunt works for Solitario Exploration & Royalty based in Wheat Ridge, CO.

Jeffrey B. Jennings is the president of Harris, Brown & Kelmer and lives in Bismarck, ND.

Timothy E. Lien is an engineering manager for Kinder Morgan and lives in Midland, TX.

Michael G. Maslowski is the COO of Golden Predator and lives in Hayden, ID.

Jean-Jacques Newey is a reservoir engineer for Anschutz and lives in Louisville, CO.

Randy L. Nickerson is a VP, exploration, for Caza Oil & Gas and lives in Houston, TX.

Scott K. Palm is the president of Cran Optics and lives in Alpharetta, GA.

Frank J. Papish Jr. is a general supervisor quality for Evraz Rocky Mountain Steel Mills and lives in Pueblo, CO.

Len I. Seymour is a well site leader for BP Exploration (Alaska) and lives in Anchorage, AK.

Conrad H. Smith is a director of Rockies engineering for DCP Midstream and lives in Littleton, CO.

Steven D. Smith is working for Phillips 66 and lives in Houston, TX.

Editor's Note: Alumni from the classes of 1981 to 2011 who have recent updates online or have uploaded photos to minesalumni.com over the last three months are listed. In addition, all class notes published in *Mines* magazine in the last four years are available on the site. When you visit, take a few moments to enter your latest information and upload some photos—we'll then list you here in the next issue. For online viewing instructions, click on Class Notes at minesmagazine.com.

1981

Cris P. Angelos
Leanne M. Baker
Gregory A. Ernster
Alexander C. Goforth
Raye L. Musgrave-Fischl
Douglas C. Peters
W. Robert Rose
Douglas T. Rosenoff
W. David Tyler
Thomas J. Vander Ark
Glenn M. Vangolen

1982

Rene Abreu
Robert W. Borruco
Dwight Burford
Scott K. Burkholder
Mark E. Bush
Mark H. Nilsson
Eric F. Peterson
David J. Reimer

Karl S. Zachry
Keith Zmerzlikar

1983

Richard M. Cieslewicz
Lon M. Cooper
Joel A. Eacker
Rodger D. Greer
Charles T. Harper
Stephen T. Harpham
Holly Rhoads Lindsey
John C. Minden
Keith S. Roberts
Cynthia A. Truby

1984

Daniel E. Barron
Karl E. Brockmeier
William H. Butler
Samuel J. Dennis
Michael Joseph Glenn
Jeffrey Lee

John Losche
Kirk H. McDaniel
Robin F. Randall
Robert N. Sencenbaugh
Bret R. Siepmann
Matthew P. Strever

1985

Daniel G. Anderson
Tawnya M. Chott
Randall J. Fortin
Michael F. Fry
Michelle J. Humphrey
Fujiwara Keizo
Roy A. Kemp
Elizabeth L. Lake
Martin K. Lange
Audrey A. Leonard
Curtis L. Lightle
Sophie-Adelaide Magnier
Michael N. Mears

Robert E. Moore
Debra H. Phillips
Clayton S. Pluchek
Rodney M. Skaufel
Robert A. Spee
Neil W. Strain
Ellen L. Vernetzky

1986

Eric A. Blomberg
Lewis D. Dennis
Nita Jenkins
Mary C. Jensen
Christopher E. Kinsel
Kyle A. Moreau
Eric Phannenstiel
Leonard B. Smith
Stephen D. Whidden
Robert M. Zimmerman

1987

W. Larry Fink
Jeffrey W. Harwell

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departmental research,
academic lectures,
and student life
at CSM



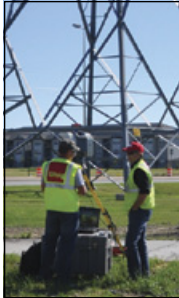
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Profile

Wild Women '85-'90

An unbreakable bond: 25 years of friendship, beginning at Mines

In 1987, President Reagan was managing Iran-Contra, the U.S. stock market crashed on Black Monday, a gallon of gas cost \$0.89, and the Wild Women held their first weekend getaway in South Fork, Colo. Seven Mines alumnae went on that first trip, and those same women, and more, have continued to meet every year since, celebrating their 25th anniversary at last year's homecoming weekend.

"The 13 Wild Women did not start out with any sort of idea about who would join us for these planned yearly sojourns," says Kristin Westwater McDonald '86. Various friends came

friends from Mines for a Corundum Man triathlon ("nine on the Mohs scale of hardness," McDonald points out), in which the events were darts, pool and beer drinking.

"The reason we started in South Fork is a lot of us were geophysicists and that's where we had our geophysical field camp," explains Melanie Marquardt Westergaard '87. "About seven of us drove in Lezah Fellin Saunders' '90 enormous 1964 Mercedes Benz."

She recalls one day in 1999, just prior to her wedding, when she was preparing to go on a winter climb with her now-



2008: Anna Maria, Fla.

along during their early years, but it wasn't long before a core group of the most committed emerged.

And commitment is the right word: "For better or worse or Wild Woman Weekend" is the mantra the group has jokingly adopted. "I was the first to get married, so we started a tradition of having the husband agree prenuptially that he would never stand in the way of Wild Woman Weekend," says McDonald.

Jean Rickert Wilson '86 initiated the first Wild Woman Weekend (aka WWW), based on an idea from her husband, David Wilson '84. He got together with

husband, Edwin Westergaard, outside of Anchorage, where they lived. Ed told her he was going to pick up someone from the airport en route, and when they arrived at the airport, she saw Jane Hallenbeck Paris '86, who was also living in Anchorage. "I happened to have the very same bag as hers because she got it for me, so I said, there's Jane with her bag, and there's Jane with my bag. Turns out I was being kidnapped to go to Wild Woman Weekend," Westergaard recalls. In her fleece and heavy boots, with a ball and chain around her ankle, she was headed to sunny Sedona, Ariz., for the 13th WWW.

Campus connection

The group has left its mark on the school. All 13 joined the sorority Omega Delta Psi (five were founding members in 1983) and participated in the decision to affiliate with Pi Beta Phi; this new direction led to bringing the Colorado Delta chapter of Pi Phi to campus in 1985. Most of them swam for Coach Bob McCandless (a Mines Hall of Fame Inductee), and many started the first Mines women's club soccer team, coached by Thomas Wildeman, now professor emeritus of chemistry and geochemistry. "We had to wear the old boys' soccer uniforms because there was literally not one cent for us to have uniforms," McDonald laughs.

Sports, sororities and seismic crews helped to bring the WW together. Catherine Reasoner Gardner '85 met Wilson as a Mobil summer hire "in the wilds of Montana," Gardner recalls. "We spent that summer working together and running around Flathead Lake—two blonde college co-eds on a seismic crew populated by rough-and-tumble east Texas boys, and Flathead and Blackfoot Indians. Together, as 19-year-old girls from Mines, we laid geophones up and down mountains, thwarted bears and amorous juggies, laid out explosives, drove vibroseis trucks, 'flew' helicopters and learned to drink 'Red Raniers.'"

The adventures have continued for 25 years, from the close call during the deep-river crossing on horseback in Lake Tahoe, Nev., in 1995 that "almost

1992: Taos, N.M.



lost a few people," according to Westergaard, to the trip to Calistoga, Calif., in 1997 when news made it around the world that Princess Diana had died. They have sea kayaked, mountain biked, rafted, skied, hiked and, most importantly, reconnected in those quiet—or loud—conversations that keep friends close. As the years have passed, "we found it's not about the activities," Westergaard says. "It's become more about having a fun house and spending time together."

The friends returned to campus for their 25th anniversary last year, and in addition to taking in some homecoming

activities, the group went on a Mines-style scavenger hunt, created by the women who live in the Denver area. "We took away their phones and made them do things like identify the chemical formula of apatite, determine the thickness of the Denver formation, and find out when Cecil and Ida Green passed away," McDonald says. Westergaard chimes in, "Then they went to some of the fraternities and had to get fraternity guys to give them a piece of their homework."

How did these women manage to remain so intimately connected for a quarter century? McDonald knows. "As you are starting your life after school, there are so many demands on your time and money, that if you don't prioritize these friendships, they could easily wane. I am very grateful that we got the group going early, and now it really has a life of its own. There is no way anyone is going to stop now."

—Amie Chitwood



Read more about the Wild Women's post-Mines activities at minesmagazine.com.

1. **Michele Vivona** '86; senior VP, LexisNexis Global Digital Strategy; lives in Burien, Wash.
2. **Karla Fischer Dailey** '88; senior resource planner, City of Palo Alto Utilities; lives in Menlo Park, Calif.
3. **Lezah Fellin Saunders** '90; DIY contractor and volunteer; president of the board for Ouray Chamber, Parks & Rec Committee and other Ouray volunteer positions; lives in Ouray, Colo.
4. **Jody Kamrath** '88; BP facilities engineer; lives in Anchorage, Alaska.
5. **Melanie Marquardt Westergaard** '87; geoscience advisor, Encana Oil & Gas (USA); lives in Golden, Colo.
6. **Jean Rickert Wilson** '86; hiker, skier, golfer, mountain biker, stay-at-home-mom to three kids; lives in Evergreen, Colo.
7. **Betsy Ryan LeaRussa** '89; project controls lead, ConocoPhillips Transportation Projects; lives in Houston, Texas.
8. **Kirsten Derr** '86, MS '89; environmental analyst, Encana Oil & Gas (USA); lives in Denver, Colo.
9. **Jane Hallenbeck Paris** '86; senior hydrogeologist, Oasis Environmental; lives in Golden, Colo.
10. **Catherine Reasoner Gardner** '85; co-owner of Gardner Oil & Gas; lives in Houston, Texas.
11. **Kristin Zembeck-England** '85; geophysics manager for Southwestern Energy; lives in Houston, Texas.
12. **Kristin Westwater McDonald** '86; president and founder, T2 Technologies; lives in Littleton, Colo.
13. **Julye Nugent** '86; VP geoscience, BHP Billiton Petroleum; lives in Houston, Texas.

*Founding member of Omega Delta Psi



Alumni

Fast Forward

Nancy P. Jackson
Michael W. Miks
Philip B. Rittgers
Tutuko Sarno 📷
James M. Shaw
Patricia G. Smith
John A. Starck
Richard G. Weber
Melanie Marquardt
Westergaard

1988

Carlos A. Baptista
Holly L. Burch
Robert E. Farrar
Dean J. Gipson
Wendy M. Gort
James A. Hull
Lisa E. Kolp
Gerald J. Sherman
David W. Sobernheim
Monica Steikunas-Griffitt
Jon B. Wisda

1989

Brad G. Baker
Antonio A. Inserti
Peter L. Jorgenson
Bryan J. Kinderman
Andrew D. Stewart
Tracy L. Vowel
Tom J. Walker

1990

Brett D. Ashford
Bruce C. Bunch
Todd W. Dixon
Wendy D. King
James A. Knowles

Russell C. McMullan
Salah A. Zugail Maime

1991

Robert J. Golden Jr.
Samantha F. Meador
Brandon K. Patterson
John T. Sanchez III
Matthew A. Sares

1992

Jeffery J. Bauer
Andrew M. Dieball
Russell A. Frishmuth
Paul Lillis
William S. Murphy Jr.
Damon T. Parker
Jon L. Powell
Toni S. Showan
Randall P. Sulte
Natalie C.T. Van Tyne
Scott R. Werner
Timothy R. Yearous

1993

Flavio G. Boskovitz
Erik A. Carlson
Paul L. Glader
Troy C. Gorrell
Mary C. Griggs
Thomas M. Grimaldi
Shrihari K. Kelkar
Danielle L. Reader
Gregory J. Riggs
Michael R. Walker
Bradley B. Williams

1994

Craig L. Andersen

Kathleen A. Anderson
Gerd K.H. von Glinski

1995

T. Jasper Fai
Brian W. Fehr
Brian L. Haverland
Gregory L. Madden
Austina C. Matthias
Carrie J. McClelland
Robert W. Reisinger
Michael J. Vint
Leigh A. Webster

1996

Richard A. Berg
Wilson S. Clayton
David D. Faulder
Melissa L. Fuller
Jennifer R. Glennon
Covey Hall
Stafford R. Maheu Jr.
Patrick A. Mays
Michael B. Pickett
Michael P. Reback
Christine Staples-Hatfield
Roger N. Thompson
Maurice A. Tucker
Fabiola N. Williams

1997

Donna Anderson 📷
Ross E. Collins
Justin A. Coppin
Randy G. Edelen
Charles L. Farris
Ami N. Gignac
Wm. Mark Hart
Johanna S. Ivy

Sean J. Makens
Benjamin Panfalone
Paul D. Roamer
Suzanne E. Satter
Michael E. Stahl

1998

Steven E. German
Jess Kindler 📷
Michael G. Northrop
Roman Pinon
Robert M. Schulz
Edward W. Stafford
Bennett G. Williams

1999

John Brinks
Nicolas Chornet
Nicole A. Corlett
Abraham Emond 📷
Gregory D. Metcalf
Rafael D. Montalvo
Raphael Pieters 📷
Craig L. Randolph
David L. Sedarsky
R. Kevin Thompson
Rodney K. Thompson
Nathan A. Wanstrath
Rev. Richard A. Williams

2000

Francine Amon
Anne Grau
Christophe G.P. Ponsart
Bharath Rajappa

2001

Arthur B. Brown
Jason M. Brown
Carol Weber Carlson
Andrea Resch
Gardiner
Brian K. Hayden
Clinton M. Johnson
Jonathan J. Kepler
Khristopher A. Kircher
Gina Mabe
Angelina C. Southcott
Luke D. Stumme
Sirine Tajer
Ruth Tinnacher
Holly Willman 📷

2002

Eric A. Bergstrom
Joshua J. Brnak
Sarah Hunke
Jacob B. Kapp
Robert C. Sawaya
Ryan D. Waterbury

2003

Donald I. Althouse Jr.
Robert W. Applegate Jr.
Dustin E. Bennetts
Jeffrey J. Jantos
Jill M. Kent
Christopher L. Landon
Jake Latham 📷
Mathieu C. Le Renard
William E. Martinez
Joe Mazumdar
Joseph McCarthy
Shawn P. O'Keefe

David A. Renner
Erik D. Smith
Chelsey L. Thompson
Andrew S. Tripp
Matthew R. Walsh
Paul C. Weyant
Hector A. Wills
Andrew T. Zwickl

2004

Angela D. Allison
Richard Arvizo 📷
Catryn E. Becker
Jasper Bertisen
Wade M. Binkley
Jonathan H. Bryant
Brian P. Connors
Nathan R. Hedrick
Tyler P. Hunter
Elizabeth A. LaBarre
Jenelle M. Morris
Saw Ler Mu 📷
Robert J. Pankrath
Bonnie E. Powell
Russell A. Powell
Oliver D. Ramirez
H. Shawn Smith
Cooper Swenson 📷
Maxine J. von Eye
Virginia G. Willett

2005

James M. Arthurs
Matthieu Delaby 📷
Sara J. Eberl
Brian D. Glater
Mark A. Goldstein
Vincent M. Gonzales
John A. Harvey
SangWoo Kim

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Bruce Kugler
Patent Attorney, Principal
B.S., Petroleum Engineering,
1981



Doug Swartz
Patent Attorney, Principal
B.S., Mining Engineering,
Minor in Metallurgical
Engineering, 1982



Brad Knepper
Patent Attorney, Principal
B.S., Electrical Engineering,
1998



Matthew Ellsworth
Patent Agent/Technical Specialist
B.S., Engineering, with honors, 2003
M.S., Engineering Technology
Management, 2005
Top Graduating Electrical Engineer

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Ian C. McEachern
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 Kevin P. McNamee
 Timothy M. Mess
 Christopher Moerbe
 ChangSoo Moon
 Rebekah Mullen
 Robert M. Ratz
 Justin C. Ray
 Jonathan J. Robertson
 Christopher W. Schaumberg
 Andrew P. Schmid 
 Luz Slauter 
 Lindsey M. Talento
 Robert T. Wagner
 Daniel R. Ward
 Jesse R. Whitney-Blane
 Daniel K. Winterholter
 Heidi R. Ziemann

2006

Mahmood Ahmadi
 Megan L. Atwood
 James E. Bland
 Regina M. Caputo
 Austin R. Christensen
 Ryan Collett 
 Eric E. Eckberg
 Christopher A. Green 
 William G. Hadley
 Jonathan Carter Herbert 
 Andrew J. Hicks
 Miss Nica M. Hoshijo
 George S. Klinger
 Dustin G. Mahoney
 Rubeca T. Martinez
 Daniel J. Medina
 Cameron K. Moyer
 Benito Perez 
 Jesus A. Pinto
 Erin M. Rundberget
 Rachel R. (Sommers) Stecklein
 Chotipong Somrit
 Jesse B. Spooner
 Christopher G. Thielen
 Andrew M. Todd
 Patrick R. Wieck

2007

Mohd I. Aris
 Stephanie E. Ashley
 Amrut Athavale
 Sheena M. Barnes
 Michael A. Brandt
 Michael David

Caldwell
 Reynaldo W. Cardona
 Brent Chacon
 Caroline U. Chapman
 Justin C. Chichester
 Christina B. Curato
 Ryan J. Ellis
 Christopher L. Farwell
 Sarah L. Galloway
 Peter J. Gronewoller
 Nathan T. Hancock
 Donald C. Hazen
 Melissa E. Hubbard
 Michael A. Hurowitz
 Scott J. Ikard 
 Ian P. Lewis
 Henry D. Lopez
 Michael J. McGlynn
 Clayton J. McWhite
 Ryan P. Meany
 Deborah L. Mink
 John A. Nickell
 Thomas C. Oberheide
 Jeffrey B. Perkins
 Christopher A. Phillips
 Laura A. Pyhtila
 Clay A. Rosson
 Adam J. Shuler
 James D. Watson

2008

Hamad Al-Mostaneer 
 Dawn N. Anderson
 Michael E.E. Breece
 Andrew T. Brewer
 Karen M. Budgell
 Ronnayut Busaba
 Caryn J. Carruthers
 Rachael E. Cisneros
 Zachary A. Cornett
 Steven D. Cratty
 Andrea L. Deiotte
 Ronald S. Deiotte
 Diana C. Diaz
 Robert Donley
 Jarrid C. Franke
 Daniel A. Funderburk
 Rachel (des Cognets) Geiger
 Richard M. Gonzales
 William S. Hatrick
 Adam Y. Hensel
 Jonathan L. Ilderton
 Nikita Kazakov
 Aziz Kukenov 
 Chandra M. Lippitt
 Chad D. Lobato 
 Timothy J. Loughheed Jr.
 Anthony A. Melorango

Jenny S. Nakai
 Daniel A. Neal
 Aprill M. Nelson
 Oluwaseun O. Ogungbenle
 Jason R. Peterson
 Marissa Petty
 Renee M. Rainguet
 Nelson Rojas Avella
 Thomas G. Schubert
 Nicole M. Shafer
 David Sittner
 Robert M. Slocum
 Sean H. Stevens
 Andrew J. Summers
 Zachery J. Swanson
 Timothy P. Thayer
 Christopher M. Tipple
 Daniel Travis
 Arturo L. Vasquez Córdano

2009

Richard L. Ammel
 Rawan K. Bardini
 Ryan J. Bartingale
 Barbara A. Bennet
 Terry F. Bisiar
 Kenneth D. Dodson
 Sarah A. Edwards
 Lindsey A. Frazier
 Elise M. Goggin
 James L. Harrold
 Vincent J. Hecker
 Sara M. Hogy
 Garret A. Huelson
 Mark A. Husted
 Brittney Hyden 
 Timothy W. Jochum
 Benjamin G. Keiser 
 Brandon L. Killinger
 Yann A. LeCostaouec
 Joyce C. Lee
 Kathleen A. Lindstrom
 Chad B. Linse
 Nathanael Lohse 
 James D. Molde
 Daniel J. Morris
 Jeffrey S. Parham
 Megan E. Petko
 Nicholas P. Podany
 David R. Pruit
 Jacob E. Rundell
 Eva I. Salas
 Fadi M. Sawaged
 Paul E. Schulte
 Daniel R. Slattery
 Kevin W. Smith
 Kristin M. Smith
 Matthew T. Sonnenberg
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2010

Marshall G. Aurand
Rachel K. Ballantyne

Nick C. Bates
Christopher E. Beach
Megan E. Bongirno
Ryan P. Boyle
Jamie L. Brodt
Peter D. Bucknam
Joshua Y. Carrell
David W. Chase
Kyle L. Clark
Khristian J. Clymer
Stephen P. Coryell

Erin E. Eidson
Lisa A. Federico
Alexandra E. Fleming
Danielle A. Fox
Garrack W. Friedly
Victor F. Fuerman
Ginger M. Gilfillan
Jessica C. Grainger
Tony M.
Hanneman Jr.
Shiloh C. Hernandez

Alexander L. Hureau
Silver C. Ibenye
Michael T. Kelly
James W. Klingler
Susan M. Lamb
Barrett A. Lavergne
William P.
Leavenworth II
Brad J. Leick
Evan J. Lindenbach
Yongxia Liu

Cameron D. Luethy
William R.
MacIntyre IV
Craig S. Maurer
Robert H. McGourty
Brian H. McLachlan
Christopher R.
Metcalf
Trevor L. Morris
Jahed S. Nabiyyar
Chris R. Navrides

Spencer T. Nelson
Keith J. Norbeck
Brady L. Nunn
Sean P. O'Brien
Heather E. Oertli
Robert F. Percival II
Jacob S. Phillips
Jed D. Purcell
Aimee N. Queen
Michelle Y. Quigley
Rachel E. Rabun

Profile

Todd Wang '86

Drawn to humanitarian work, alumnus now building bridges in Latin America with Mines

Over the last 25 years, Todd Wang has led projects in developing countries, witnessing firsthand how the application of a little technology and know-how can have a big impact on disadvantaged communities. While many of these projects were with the Army Corps of Engineers, since entering civilian life, he's continued the work, focusing on building pedestrian bridges in remote locations and working in conjunction with humanitarian relief organizations, including Engineers Without Borders and Bridges to Prosperity. In January, Wang led a group of students from Mines' chapter of EWB to the Carazo region of Nicaragua on a scouting mission to look at four possible bridge sites.

Wang discovered his calling while still a student. "It all started one night in Golden," he explains. As a cadet in ROTC, he was attending a talk given by a recent graduate in the army who was working on a water project with his unit in Honduras. Something clicked, and Wang realized this was the work he wanted to do. After graduating, he pursued this goal, starting with his first unit assignment, and

eventually becoming the go-to consultant for such development projects.

When he retired from the military a few years ago and started to work with CH2M Hill, Wang wanted to find a way to continue applying his skills in the developing world. After a 2010 trip to Nicaragua with his two children to assess community needs, Wang connected with Mike Paddock, a colleague at CH2M Hill who sits on the Board of EWB-USA and who, working in conjunction with an organization called Bridges to Prosperity, has helped several student groups with bridge-building projects in Latin America. It was just the connection Wang was looking for, and he went on to mentor an EWB group of students from Rice University who built a bridge in the Carazo and Matagalpa regions of Nicaragua. He's excited to be launching a similar project with students from Mines.

Their first bridge is likely to be based on a standard B2P design: a suspended bridge supported by cables that pass over towers on either bank and are securely anchored to points beyond. However, every project needs to be site-adapted, and that's what



Provided by Todd Wang

Todd Wang is prepared to devote half his time to work in developing countries, but only in those where the community wants and needs the help.

the students will be working on after a thorough feasibility study of the chosen site this spring.

The number one criteria in determining a location for a bridge is that the community really wants it, says Wang. "It has to be their bridge... I want their kids to be able to say, 'Mom and dad put this bridge together with the Americans' help,'" he says.

Apart from cable—donated to B2P by two U.S. shipping ports—these bridges are made with locally sourced materials that the villagers are used to working with. At the end of each project, a day is spent going over the Spanish language

David B.
Richardson Jr.
Nathan S. Roberts
Sam H. Sabbagh
Allison E. Satterfield
Devyn A. Slaughter
Jennifer E. Smith
Joseph T. Stevanak
Phillip C. Suitt
Henry D. Swider

Heather K.
Thompson
Jeffery A. Thompson
Tyler J. Thyfault
Tyler B. Tift
Peter D. Trask
Jon M. Wallace
Michael L. Woodward
Nicholas B. Wyatt
Nicholas P. Zehring

2011
Michael P. Armstrong
Kristin D. Barrett
Amanda B. Bell
Teresa L. Burbank
Joseph J. Foremski
Erica T. Hanley
Bhavin N. Jariwala
Jennifer W. Larue
James M. Milford
Nickolas A. Miller

Heather A. Miner
Odon M. Musimbi
Bethany A. Pickett
Michael J. Pollachek
Amanda J. Rock
Brittany N. Smith
Patrick A. Spence
Travis S. Venson
Jaime M. Wells

“It has to be their bridge... I want their kids to be able to say, ‘Mom and dad put this bridge together with the Americans’ help.’”

maintenance manual, which provides a schedule for checking such things as decking boards and screws, and matching paint marks on the saddle where the cable crosses the tower to ensure cable integrity and make certain the anchors are holding fast.

The Mines students will be involved with the project from start to finish; for most it will be their first major engineering project in the developing world, although Wang stresses that the engineering and construction will be the easy part. As the students interact in a different culture on a project that impacts multiple communities (sometimes with vying local agendas), negotiate with municipal agents, and deal with the logistics of limited resources and lack of infrastructure in a hard-to-access part of the developing world, they will need to exercise diplomacy, tenacity, patience and adaptability.

But if successful, they'll see the results of their work, says Wang. The rainy season in Nicaragua lasts from May to December, during which time the Rio Ocho Mogo, which they intend

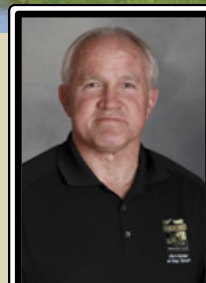
to span, can be impassable for weeks on end. At such times, villagers living across the river from the moderately sized town of Santa Teresa must walk several hours to access the secondary schools, hospital and other resources on which they depend. The footbridge they plan to build will cut this journey down to a fraction of the time.

Wang finds this work deeply gratifying and would like to spend more time on it. In his current position working on water resource issues and environmental cleanup with CH2M Hill, he's given the flexibility to devote about 50 days a year to the work, but if he can double or quadruple that, he'd like to. It's not just that he's passionate about building bridges; he's also passionate about sharing the experience with others. As he explains, this kind of bridge building is a communal undertaking that transforms the lives not only of the local people benefiting from the bridge, but also of the students who live, work, problem-solve and eventually celebrate with the local community.

—Kristen Daly



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Passings

*"Like a bird singing in the rain,
Let grateful memories survive in time of sorrow."*

—Robert Louis Stevenson



PETER I. BEDIZ '41, MS '42 of Calgary, Alberta, died December 4, 2010. Born in 1914, Peter was educated in Turkey and was a master of languages, speaking English, French, and Turkish fluently, and able to converse in Greek. He attended Mines on a grant from the Turkish government and graduated with a professional degree in geological engineering. A year later, he was awarded a master's degree in geophysics—one of the program's first graduates at a time when Mines was the only school in the world offering a degree in the subject. He later earned a doctorate in economic geology from MIT.

He began his career with National Geophysical, but left to work with Turkey's Mining Exploration Institute shortly thereafter. Following compulsory military service, Peter returned to the U.S. with his wife and children and began working for Century Geophysical, where he remained for 22 years, ultimately becoming president and CEO. He was involved in a number of professional organizations throughout his career, and at one point ran his own consulting firm. He is survived by his wife, Ayzer; sons Joseph, John and Peter; stepchildren Jade Yesim and Emre Unal; four grandchildren; and five great-grandchildren.



HENRY P. EHRLINGER III '50 of Eldorado, Ill., died May 25, 2007. Henry was born in Kellogg, Idaho, in 1925, but spent his youth in six states. He served in the Solomon Islands during World War II and took part in the liberation of the Philippines. He was honorably discharged as a tech sergeant in 1945. Having worked in his father's silver mine near Silverton, he attended to Mines, where he joined the

Sigma Alpha Epsilon fraternity and earned a professional degree in mining engineering. He also met and married Lorraine Schaublin. After Mines, he went on to earn a master's degree in 1953 in metallurgical engineering from the University of Nevada.

He worked for Asarco's Mexican Mining Department from 1957 to 1964, during which time he learned Spanish. He then worked for Pimu Mining, before joining the Illinois State Geological Survey in 1966. In 1970, Henry married his second wife, Rose Butler Wilson. After leading a variety of engineering projects in the 1970s and early 1980s, he returned to the ISGS in 1985, where he remained until retiring in 1993 and moving with Rose to Eldorado. He consulted and remained active in the Society of Mining and Metallurgical Engineering through most of his career. He is survived by his daughters, Constance Maytum and Paula Soholt; stepdaughter Christie Becker; stepson Vernon Wilson; one grandchild; six step-grandchildren; and five stepgreat-grandchildren.



BERNARD "BERNIE" JOE FERRIS '47, MS '48 of Abilene, Texas, died September 22, 2011. Bernie was born in 1922 in Denver and grew up in Lakewood. Before attending Mines, he served in the U.S. Army during World War II as a training officer in the Corps of Engineers. At Mines, Bernie was a member of the Sigma Phi Epsilon fraternity.

He graduated with professional and master's degrees in geological engineering, having been awarded Shell Oil's first graduate fellowship in petroleum geology. He began his career with Shell and held a number of technical and managerial positions with the company, including division exploration manager, manager of geological research, and chief geologist of the international region. After retiring from Shell in Houston, he joined an independent oil company in Denver as senior vice president of exploration.

A member of the American Association of Petroleum Geologists, Bernie published numerous papers in geology and geophysical journals during his career. He enjoyed traveling, skiing, hiking in the mountains, parlor magic, ballroom dancing and ping-pong. His wife of 64 years, Betty, predeceased him. He is survived by his daughter, Susan Johnson; son Randy; and two grandchildren.



PAUL J. FRITTS '52 of Mendocino, Calif., died April 13, 2011. Born in 1930 in Topeka, Kan., he grew up riding to house calls with his grandfather, a country doctor. An outstanding student and member of the ROTC in high school, Paul was offered a place at West Point, but turned it down to study geological engineering at Mines. While studying for his

professional degree, he remained in ROTC and was commissioned in the U.S. Army Corps of Engineers after graduation. He served as a second lieutenant in charge of the 41st Topographic Division of the U.S. Army in Korea. During his service, he married his first wife, Evelyn.

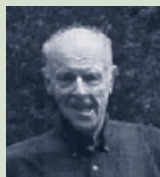
In 1954, Paul joined Stanolind Oil in Oklahoma. Shortly thereafter, he started teaching in the Division of Engineering at Mines. With a passion for geology, he left Mines in the early 1960s to join Chevron as a micropaleontologist in Bakersfield, Calif. In 1965, he joined California State University, Long Beach, and by 1970 was department chairman, a title he held for 14 years. In 1990, he retired from teaching and married his second wife, Roswitha B. Grannell, also a geologist.

Paul enjoyed electronics, computers, animals and recounting war stories, some of which he contributed to a book on the Korean War.



ROBERT "BOB" F. GARLAND '52 of Douglas, Wyo., died May 6, 2011. Bob was born in 1926 in Tulsa, Okla., and grew up in Oklahoma and Texas. He graduated from the Texas Military Institute in 1944 and was preparing for deployment with the Navy when the war ended. At Mines, while earning a professional degree in geological engineering, he played football for the school and was a member of the Sigma Alpha Epsilon fraternity.

Bob started his career in Houston, followed by stints in Mexico and Italy. Eventually his career led him to Casper, Wyo., where he worked for Seaboard Oil before becoming an independent consultant. In 1961, he moved his family to Bloomington, and in 1976 they returned to Casper so Bob could return to the oil industry. They lived there until 1988, when they moved to the 6G Ranch in Douglas. He loved geology, history, art, music and photography, and became an accomplished landscape painter. He is survived by his wife of 58 years, Georgia; sons Robert, Scott and Jeff; daughter Kristen Slyman; and eight grandchildren.



THEODORE "TED" L. GOUDVIS '40 of Cambridge, Mass., died September 19, 2009. Born in 1918, Ted grew up near New York City. He graduated from Mines with a professional degree in mining engineering and was a member of Sigma Phi Epsilon fraternity.

During World War II, Ted joined the Navy "Seabees" (Construction Battalion) and served in France and the Philippines. After the war, he and a college friend started a small business in northern Ohio manufacturing concrete products. He married Elinora Lewis, and they brought their two daughters up close to the shores of Lake Erie, where the family enjoyed sailing in the summer and ice boating in the winter. He visited and fell in love with Aspen, Colo., in the 1960s, and built a house there when he retired in 1980. He was an avid hiker, skier and nature lover. Ted was a regular at seminars, institute offerings and the music festival in Aspen. He is survived by his daughters, Patricia and Anne, and four grandchildren.



STEVE W. HACKETT '68 of Homer, Alaska, died February 26, 2011. Steve was born in Monterey, Calif., in 1945. The son of a national park ranger, his passion for wilderness was lifelong. He was a graduate of Estes Park High School and earned a professional degree in geophysical engineering from Mines, where he was a member of Blue Key Honor Society, Sigma Phi Epsilon fraternity, Sigma Gamma Epsilon honor society, and the track and field team. Shortly after graduation, he moved to Alaska, where he earned a master's degree in geology and geophysics in 1977 from the University of Alaska, Fairbanks.

In addition to being a geologist, Steve worked as a trail crew foreman in Rocky Mountain National Park; a mountaineering guide and back country ranger in Denali National Park; an avalanche specialist, safety instructor and ski instructor at Alyeska ski area; and a math and science teacher, and home school contact teacher for Interior Distance Education of Alaska. He married Ann Hackett in 1987 after they met on the Ruth Glacier, where he maintained a base camp and a dogsledding service. Steve enjoyed the outdoors, climbing, traveling and volunteering. He is survived by his wife, Ann.



PETER HARTLEY of Wheat Ridge, Colo., died November 28, 2010. A professor emeritus, he was born in 1936 and joined Mines in 1974 as an assistant professor in humanities and social sciences. He retired in 1999 and was on transition until 2004. Before coming to Mines, Peter taught at the University of Wyoming and in public school in Minisink, New York. He enjoyed running, hunting, and hiking, and was a staunch environmentalist. Peter is survived by his wife of 51 years, Sharon; daughter Cara; son Ryder; and grandson Michael.



ROBERT "BOB" F. HARTMAN '42 of Pleasanton, Calif., died December 28, 2010. He was born in 1919 in El Centro, Calif. While at Mines, Bob was a member of the American Society of Mechanical Engineers and the Sigma Nu fraternity, and graduated with a professional degree in petroleum engineering.

In 1942, he married Mary Ellen Perry. That same year, Bob began his professional career as a petroleum engineer for Standard Oil in El Segundo, Calif. In 1956, he patented a method for the recovery of hydrocarbon vapors emitted during the pumping process, resulting in a major reduction in air pollution. The following year, Bob took his family to Adaban, Iran, to work in conjunction with National Iranian Oil for two years. In 1962 he received his master's degree in engineering from UCLA.

Bob retired from Chevron in 1982 after 40 years of service, but he continued his public service to philanthropic organizations, his local church, and Plumas Eureka State Park, where he reconstructed the assay office and gave lectures on ore milling. After 62 years of marriage, he was predeceased by Mary Ellen. He is survived by his second wife, Dorothy; daughters Janice Cheney, Linda Hall and Carol Smith; seven grandchildren, including Shawn Cheney '97; and nine great-grandchildren.



LLOYD W. MADDEN '41 of Midland, Texas, died December 26, 2011. Born in 1918, Lloyd graduated from high school in 1936 in Manhattan, Kan., before coming to Mines, where he distinguished himself as an athlete. He led his division in scoring for football in 1938 and 1939, helping the legendary 1939 football team achieve an undefeated season. He also represented Mines in basketball and track and field, and was awarded the Blanchard Trophy, which honors Colorado's most outstanding college athlete. Lloyd was inducted into the National Association of Intercollegiate Athletics Hall of Fame in 1961, the Colorado School of Mines Athletics Hall of Fame in 1996 (its inaugural year), the Colorado Sports Hall of Fame in 1998, and the RMAC Hall of Fame in 2003. In his last year of college, Lloyd was drafted by the Chicago Cardinals. This single season in the pros earned him money to finish at Mines the following year.

A member of the Tau Beta Pi honor society, he earned a professional degree in geological engineering and joined the exploration department of Shell Oil in Abilene, Texas, after graduating. Called into active duty with the U.S. Army Air Forces shortly thereafter, his basic training was followed by further training with the UCLA physics department, which enabled him to serve in the Pacific theater as a weather officer. He remained with the Air Forces until 1955, when he received an honorable discharge with the rank of captain. Continuing to serve in the Air Force Reserve, Lloyd

Alumni

Passings

rejoined Shell Oil and went on to work in Houston, San Antonio, Corpus Christi and Wichita Falls. He later worked with the McElroy Ranch in Midland, Texas, and subsequently with Mobil. He is survived by his wife of 60 years, Shirley; daughters Deborah Barker and Victoria Akos; sons Steven and Kim; nine grandchildren; and five great-grandchildren.



JESSE R. "BOB" MEDARIS '49 of Tulsa, Okla., died June 14, 2010. Bob was born in Denver in 1922 and graduated from Englewood High School. In 1941 he enrolled at Mines, where he was a member of Tau Beta Pi, Sigma Gamma Epsilon and Blue Key. Before completing his degree, Bob served with the U.S. Army Air Corps, reaching the rank of first lieutenant with the 13th Air Force in the South Pacific.

After the war, he returned to Mines and completed his professional degree in petroleum refining engineering. In 1945, Bob met Dorothy Patricia "Pat" Shelley, whom he married in 1947 while on military leave in Sydney, Australia. After graduating, he joined Phillips Petroleum, and then, in 1954, began a 15-year career with Standard Oil in Venezuela, Libya and Indonesia.

His second career as manager of the studies department of Crest Engineering led the family to Tulsa, although Bob's work took him to oil-producing areas around the world. When Crest Engineering moved to Houston in 1985, Bob stayed in Tulsa with Crown Tech and later moved to Fluor Daniels Williams Brothers, where he remained as a consultant until retiring in 1993. He enjoyed golf, travel, ice skating, and gardening, and was a favorite among children and pets. He is survived by his wife of 62 years; daughters Shelley Ricks and Tracey Norvell; three grandchildren; and one great-grandson.



BILL J. "BJ" MITCHELL of Lakewood, Colo., died August 14, 2011. Born in 1935, the professor emeritus taught from 1966 to 1996 in the Petroleum Engineering Department, where both students and staff admired him for his inspired teaching, wit and character. Similarly respected within the energy industry, he authored four books, six manuals and 62 papers on oil well drilling. In 2011, the Dr. Billy J. Mitchell American Driller Scholarship Fund was established at the Colorado School of Mines Foundation in his honor. BJ was predeceased by his wife, Caroline, and is survived by his two daughters.

While working on his master's degree, Tom began an 18-year career with the Colorado Department of Transportation. He eventually reached the position of pre-construction engineer for the Denver metropolitan area, and enjoyed managing the design of Denver area freeways. He later took a position with a private firm in Phoenix.



THOMAS "TOM" M. MONCHAK '70, MS '75 of Phoenix, Ariz., died June 23, 2011. Tom was born in 1947 in Pueblo, Colo., where he graduated from Central High School with honors. He earned professional and master's degrees in mathematics from Mines, where he captained the bowling team and served six years in the Army Reserves. While working on

his master's degree, Tom began an 18-year career with the Colorado Department of Transportation. He eventually reached the position of pre-construction engineer for the Denver metropolitan area, and enjoyed managing the design of Denver area freeways. He later took a position with a private firm in Phoenix.

Tom was a longtime member of the American Society of Civil Engineers and American Transportation Engineers. In 1999, Tom

met his wife, Lori, and the couple married in Sedona in 2001. After retiring in 2006, he enjoyed hiking, playing golf, poker, fishing, gardening, raising orchids, collecting kaleidoscopes and watching movies. Tom is survived by his wife, Lori; daughter Brooke; brother Dan '74; stepson Nick; and one grandchild.



LOUIS "LOU" L. PHANNENSTIEL '54 of Littleton, Colo., died November 12, 2011. Lou was born in 1932 in Hays, Kan., and moved with his family to the Denver area in 1945. After graduating from St. Francis de Sales Catholic School, he attended Rockhurst College, a Jesuit college in Kansas City. After one semester, he transferred to Mines, where he earned

a professional degree in petroleum refining engineering. The recipient of a football scholarship, he played for the varsity team and was a member of Sigma Phi Epsilon fraternity, the Blue Key Honor Society and ROTC. A regular visitor to the mountains, Lou loved to ski and was a member of the Mines ski team.

Having been introduced shortly after graduation to his wife-to-be, Margaret "Peggy" Mirocke, Lou was posted to Korea to serve with the U.S. Army Corps of Engineers. Following his honorable discharge, he joined Continental Oil in Oklahoma. After Lou and Peggy were married in 1957, they moved to Glenwood Springs, where Lou worked for Union Carbide Nuclear in Rifle. He began his long career with Air Products as a project engineer based in Allentown, Pa. While rising through the ranks, he earned an MBA from Lehigh University, and spent several years based in Surrey, England. In 1987, he retired from the position of chairman and president of Stearns Catalytic, a Denver-based subsidiary of Air Products. A member of the Mines Century Society, he remained close to Mines, attending events and serving as a judge for the Senior Design Fair for many years. Lou is survived by his wife; sons Mark and Eric '86; daughter Michelle; and six grandchildren.



BRADLEY "BRAD" R. PITNEY '57 of Houston, Texas, died April 27, 2011. Born in 1928 in Chicago, Brad grew up in Minnesota. After studying at the University of Minnesota and before serving with the U.S. Army in Korea, he married Carolyn Alice Paul. In 1953, following his discharge, Brad attended Mines, where he earned a professional degree in geophysical engineering and played on the tennis team. After graduation, he joined Chevron and was transferred to Houston in 1959. Brad was an avid dove hunter, tennis player, golfer and bridge player. He loved shooting pool, throwing horseshoes, being with family and friends, traveling and a good joke. He is survived by his son, Scott; daughter Michelle McGinnis; and seven grandchildren.

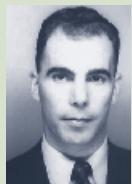
After graduation, he joined Chevron and was transferred to Houston in 1959. Brad was an avid dove hunter, tennis player, golfer and bridge player. He loved shooting pool, throwing horseshoes, being with family and friends, traveling and a good joke. He is survived by his son, Scott; daughter Michelle McGinnis; and seven grandchildren.



WILLIAM "BILL" E. SAEGART '53 of Sierra Vista, Ariz., died August 4, 2011. Bill was born in 1930 and graduated from Mines with a professional degree in geophysical engineering. A member of Kappa Sigma fraternity, he enjoyed a career in mining and exploration. He is credited with discoveries in Arizona and Mexico. After leaving the

mining industry, Bill pursued a second career in real estate, owning and operating resorts in Florida and New Mexico. He retired to Sierra Vista and enjoyed sailing in the Caribbean and the Sea of Cortez, family gatherings, golfing and bird watching. He was a

member of Rotary International and a founding member and president of the Mining Club of the Southwest and the Young Republicans. Bill is survived by his wife of 35 years, Carrie; daughters Karen Scott, Melissa Emery and Raé Van Royen-Miller; sons Stuart and David '78; and seven grandchildren.



EUGENE V. SIMONS '49 of Casper, Wyo., died September 23, 2011. Born in Los Angeles in 1921, Eugene graduated from South Pasadena High School in California and attended Mines prior to joining the U.S. Merchant Marines and serving in World War II. After the war, he returned to Mines and completed his professional degree in geological engineering. He was a member of the Alpha Tau Omega fraternity and played on the football team. His career in the oil and gas industry took him to Calgary, California, Texas and Wyoming. He waged a successful 29-year battle over rights to trona mining leases in the Wyoming Green River Basin. An avid outdoorsman, Eugene sailed the Caribbean many times. He is survived by his wife of 58 years, Jewell; daughters Linda Oliver and Julianne Simons; sons Geoffrey and Stephen; and three grandchildren.



MAYNARD SLAUGHTER of Greeley, Colo., died March 15, 2011. A professor emeritus of chemistry and geochemistry, Maynard was born in 1934. He taught and conducted research at Mines from 1969 to 1999. Prior to Mines, Maynard taught at the University of Missouri, Columbia, and spent many summers at its geology field camp in Wyoming. In addition to teaching, he worked for Gulf Oil throughout the state of Wyoming. He published nearly 50 papers and technical reports. He is survived by his wife, Judy; five children; five stepchildren; 19 grandchildren; and 12 great-grandchildren.



JAMES "JIM" V. TARANIK PhD '75 of Reno, Nev., died June 21, 2011. Jim was born in 1940 in Los Angeles and graduated from Stanford University in 1964 with a bachelor's degree in geology. He then studied at Mines and earned his doctorate in geology. Jim worked in NASA's space shuttle program for four years before, in 1982, becoming dean of the Mackay School of Mines at the University of Nevada, Reno, where he secured millions of dollars for capital construction, teaching and research.

In 1987, he was appointed president and CEO of the Desert Research Institute, where he was able to fund a variety of new projects, including the construction of two science centers. He returned to Mackay in 1998 as the Arthur Brant Endowed Chair for Geophysics, and in 2003, was again asked to serve as acting dean of the school. He was later named director of the newly restructured Mackay School of Earth Sciences and Engineering, where he remained until returning to geophysics in 2009.

During his career Jim served on a variety of boards and companies in both higher education and the space industry, and maintained active memberships with numerous professional organizations. He received the Bronze Star for bravery and meritorious services as a geologist for the U.S. Army Engineer Command in Vietnam, and NASA's Exceptional Scientific Achievement Medal. He is survived by his wife, Colleen; son Dan; daughter Debra; and three grandchildren.



BROOK D. TARBEL '50 of Tulsa, Okla., died May 22, 2011. Born in Los Angeles in 1924, Brook was drafted into the U.S. Army in 1943 and served in Europe during World War II. He landed on Normandy and fought in the Battle of the Bulge, for which he was awarded the Silver Star, Bronze Star and several Purple Hearts. After returning from the war, Brook finished his professional degree in petroleum engineering at Mines and married Jean Willard, with whom he had four children. He was a member of the Sigma Alpha Epsilon fraternity. Brook went on to work for Magnolia Petroleum, Helmerich and Payne, and White Shield Oil and Gas before he founded Tarbel Oil and Gas in 1971.

In a 1969 plane crash, Brook was paralyzed from the waist down and used a wheelchair for the rest of his life. He and his second wife, Jill, who also used a wheelchair, were renowned advocates for access to Tulsa's public transportation system and public spaces for the disabled. A member of the Metropolitan Tulsa Transit Authority's board from 1988 until his death, Brook was honored in 2007 when the Denver Avenue station in downtown Tulsa was renamed after him.

He was a member of the Society of Professional Engineers and served on several boards, including the Oklahoma Multiple Sclerosis Society and the State Independent Living Council. Brook is survived by daughters Anne Tarbel and Betsy Griffin; sons Chris and David; stepchildren Jill Iwata, Caroline Abbott, John Hott and Doug Hott; 15 grandchildren; and three great-grandchildren.

Editor's note:

The photo to the right is of Donald "Don" Eugene Miller '53 of Englewood, Colo., whose distinguished career and service to Mines was outlined in the fall 2011 issue; regrettably, we failed to accompany the memorial with his photo, kindly supplied by his family.

Due to a reporting error that dates back several years, the Gary L. Wallen reported as deceased in the fall 2011 issue is not the 1975 Mines graduate of the same name. We have not heard directly from Gary, but our research suggests he is in good health and working for Houston Drilling Management.



—Compiled and edited by Oliver Dewey and Nancy Webb

Also in Memoriam

Maynard F. Ayler '45, MS '63.....	January 5, 2009
Bartholomew P. Caruso '70.....	January 4, 1980
Lathrop V. Denslow '61.....	January 1, 1980
Charles J. Diver '52.....	December 1, 2008
Joseph C. DuBois Jr. '50.....	September 1, 2010
Jerry T. Hanks '63.....	August 27, 2010
Bruce B. Harshbarger '61.....	October 8, 1998
Wang Kun (Wayne) Hyun '86.....	2003
Raoul E. Kahn '39.....	July 8, 2002
David A. Kellogg '49.....	January 21, 1989
Samuel R. Licht Jr. '43.....	October 30, 2010
Marion J. Meyer '57.....	September 1986
C. Samuel Miller '59.....	June 13, 2010
Thomas O. Morgan '64.....	September 13, 2010
James P. Natland '58.....	December 20, 2010
Robert K. Oliver '57.....	June 19, 2010
William R. Peery '42.....	March 10, 2001

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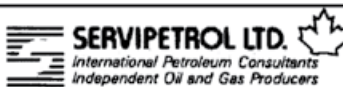
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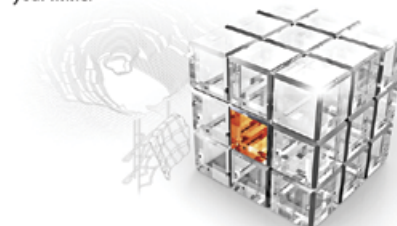
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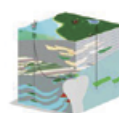
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