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back on his Mines education

Solving a 64-year-old
Mines mystery

A year of besting bests



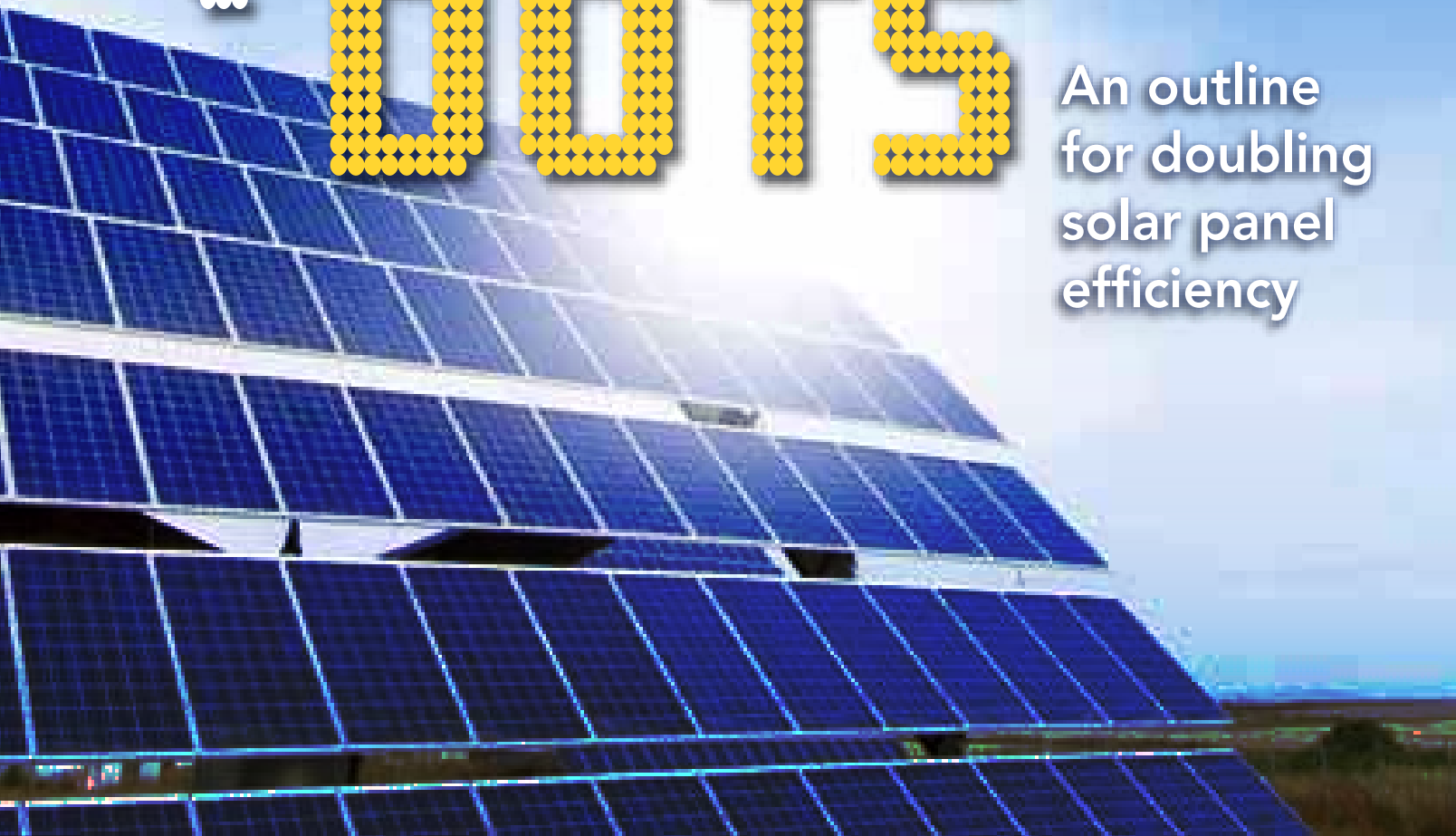
Fall 2012 Volume 102 Number 2

Mines

Colorado School of Mines Magazine

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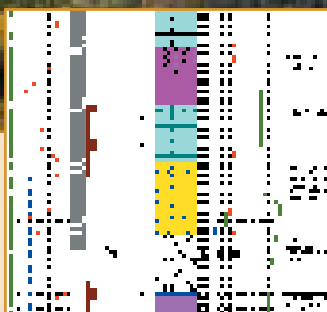


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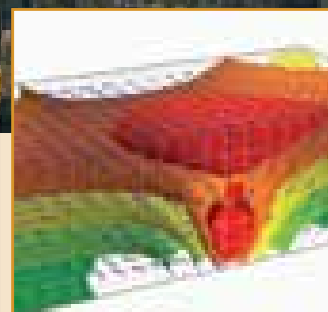


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FEATURES

18 Engineering a Quantum Leap in Solar Power

For decades, efforts to boost photovoltaic solar panel efficiencies have been disappointing. Now, thanks to researchers at Mines, a new approach that could double efficiency appears more promising than ever.

22 Boulder Bell Heist: Miners Break 64-year Silence

Two alumni anonymously share this long-kept secret, describing how and why a team of students stole the 1-ton Old Main bell from the University of Colorado gymnasium in 1948—and returned it two years later.

24 Exploring Human Landscapes

A practicing geophysicist for only a year, the celebrated author George Saunders '81 directed his curiosity about the world toward writing, which he asserts isn't so different from science.



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  **Marquez Hall** Video and photo gallery

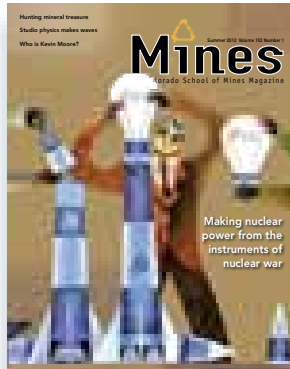
 **Engineering (Safe) Water for the World** Hennebach program guest lecture

 **Relive the M-Climb** Mines' thank you to the community

 **Mining for Morals: Corporate Social Responsibility and the Mining Industry** Jessica Smith Rolston, Hennebach assistant professor of energy policy, Liberal Arts and International Studies

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WHO LOVES THE SUMMER ISSUE? YOU DO

Cover to cover! The feature articles on mining exploration and using Russian H-bomb fuel were interesting and informative. And the “Inside Mines” coverage keeps me up-to-date on a school that’s reaching new heights in academics and sports. Well done—and thanks.

Dennis Gregg '50

It’s a great mag.... Mines is a fabulous school—so much energy and innovation. I am privileged to live near it and enjoy some of what it does and maintains—use of the library and hiring a student now and then.

**Laurence P. James
James GeoAssociates**

I always enjoy your magazine. It shows me how much Mines has changed since 1952—no Senior Day and apparently about 50% female. The sad part is no tennis anymore.

Larry Gardner '53

Editor’s note: Currently, women make up 26% of the student population at Mines. Turn to p. 16 for a comparison of recent female graduates at Mines to those at the Petroleum Institute in Abu Dhabi, UAE.

The whole publication just gets better and better, even though I’m not interested in who married whom or who gave birth to what—too old. I like to sit in my easy chair and read the print edition (could probably read it on my iPad) with a nice drink within reach.

Dick Mandel '53

Editor’s note: There’s no app for that yet, but you can enjoy the convenience of reading each issue as a pdf at minesmagazine.com.

Keep up the good work in rounding up interesting Mines-related topics and well-written articles.

Al Geyer '64

I enjoy the hard copy and having the magazine available online, especially when I want to share an article with friends.

Don Wilson '58

Very proud of the magazine and CSM.

Danny Medina '06

I love what you have created here. Congratulations!

**Janis I. Zink
Senior VP for Planning Outreach
University of Tulsa**

HARDWORKING GEOLOGISTS

Karen and I want to let you know how impressed we are with the interesting and well-written article in the summer issue of *Mines* magazine. “Hitting Paydirt” was a fun-to-read, clearly written and intriguing description of what we old desert rats do for a living. We loved the mixture of stories, showing how a combination of hard work, serendipity and romance leads to the development of significant new wealth (not to mention the thousands of high-paying jobs) for the world. It should go a long way to inspire young folks to enter the exploration business, and so we say, “Bravo—extremely well done!”

Larry Buchanan '73, PhD '79

Probably the best one yet. Love the geologic success stories—I bet that prompts a bunch more. Also enjoyed the interview with Mary McGill '62; you had to be tough to be a coed in those days. And we didn’t always make it easy.

Patrick Phillips '61

MEGATONS TO MEGAWATTS

I was captivated by your story on the role played by Jerry Grandey '68 in salvaging the 1993 agreement to dismantle Russian nuclear warheads. I remember following those events nervously, wondering what would happen to those tens of thousands of warheads in the U.S. and Russian arsenals. How fascinating it was to learn that one of our own played such a pivotal role in brokering such an important deal. Congratulations for recounting this story so brilliantly. I was especially impressed by how it explained the intricate connection between energy markets, foreign affairs and economic policy. You can be sure that my students in the McBride Honors Program will be reading this story before too long!

**Kenneth Osgood
Director, McBride Honors Program
Associate Professor, Liberal Arts &
International Studies**

Excellent article on Jerry Grandey’s involvement in the Megatons-to-Megawatts program. Good to do more articles on the uranium industry!

**Ron Witzel
Trustee, McQuiston Trust
Scholarships**

WILD WOMEN TRULY WILD

I have to make a correction to the Wild Woman story (winter 2012). I never coached them because they were uncontrollable. I used to worry about whether all CSM students ever did was study, but after being around these women for a couple of years, all my concerns were abandoned. As the note in the summer 2012 issue shows [p. 4], we were not the first Mines women’s soccer club; however, we might take claim to being the only Mines sports team to play in Folsom Field in Boulder.

**Tom Wildeman
Professor emeritus,
Chemistry and Geochemistry**



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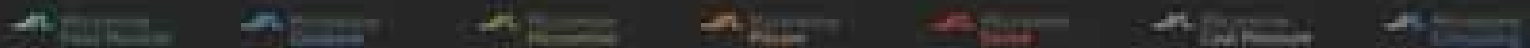


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A Bell from the Past

My curiosity about the 1948 theft of the 1,200-pound University of Colorado bell, and its mysterious reappearance two years later (see story on p. 22), was first aroused 10 years ago. I was chatting with members of the Class of '52, who were on campus to celebrate their 50-year reunion. Naturally, I asked: "How did they do it? Who did it?" No one had any idea.

This intrigued me. Once the threat of consequences had passed, wouldn't the perpetrators of such a legendary prank want others to know of their accomplishment?

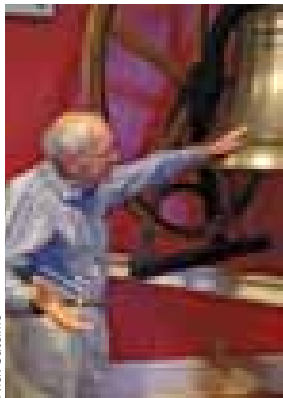
During the intervening years, I've asked several alumni about the escapade and always encountered the same response; the shroud of secrecy was, as far as I could tell, complete.

Then in 2011, I came across an article about the heist written by the University of Colorado Heritage Center's Mona Lambrecht, which mentions that the bell had been put out of commission during a celebratory ringing when CU beat Mines in a 1926 football game. I wondered whether there could be any connection between this and the theft 22 years later. Had the bell somehow come to symbolize the rivalry between the schools?

Motivated to explore further, I broadened the net. Since the bell reappeared in October 1950, perhaps the perpetrators were about to graduate? Acting on this hunch, I emailed every member of the classes of '50 and '51 that I could.

That was when the lucky break came. Several people offered helpful suggestions, but only one person had firsthand knowledge. After a long conversation, he put me in touch with one of the two ringleaders—the second is deceased. By the time I finished this second conversation, I had more than enough information for the story.

Since it was not going to be possible to obtain permission to name everyone involved in the heist, both individuals agreed it was best that names not be used, which seems fitting: Having kept details of their escapade secret for so long, it seemed appropriate to leave some of the facts untold.



For me it was exciting to hear the whole story, and I'm delighted to be able to share it with you in this issue. I'm also delighted to be able share the adjacent photo, taken in late September at the University of Colorado Heritage Center on the top floor of Old Main—the building where the bell first hung. Seeing one of the people who masterminded the operation inspect the bell for the first time since it was buried in the clay pits 64 years ago was a priceless moment.

On our way out of the museum, he mentioned that his sons had attended CU Boulder. I asked whether he'd ever told them about the heist and was amazed to learn he hadn't. However, if I read his face correctly, he's looking

forward to slipping them a copy of this issue.

If more details of this story emerge, we'll share them with you. And if this episode reminds you of another, please get in touch.

Nick Sutcliffe

Editor and Director of Communications
Colorado School of Mines Alumni Association



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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/update.

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CAMPUS ACHIEVEMENTS

The Opening of Marquez Hall Crowns a Year of Bests

A record year in giving, highest-ever SAT scores for an incoming class, more research funding than in any previous year, on-campus recruiting reaching an all-time high, new athletic achievements, and an unprecedented pace of new construction: At the start of its 138th year, Mines can lay claim to a remarkable list of accomplishments.

One of the most tangible symbols of the school's progress rises to the south of 16th Street, where the doors to Marquez Hall's capacious glass atrium officially opened on September 28 during a ceremony attended by members of the school's board of trustees, President Scoggins, lead donors Timothy '80 and Bernadette Marquez (pronounced "Marcus"), several other major donors to

the project, and members of the campus community.

It was the first time many of those attending the event had toured the Petroleum Engineering Department's impressive new home, and most were struck by the architecture. The enormous glass walls that encase the atrium are suspended from a vast wing-like steel structure that floats overhead. The German terra cotta tiles that pave the floor continue uninterrupted under the walls, connecting the airy interior with the outdoors. Windows are everywhere in the building, lighting classrooms and framing the surrounding geology of Golden.

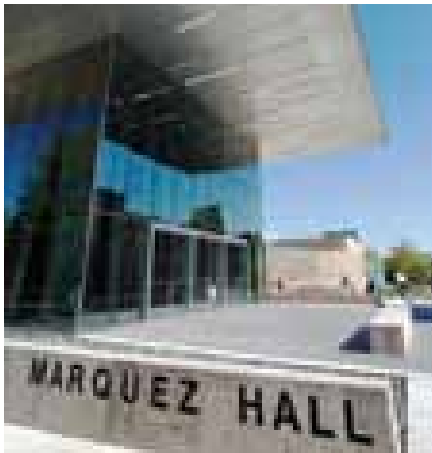
"It's something all of our alumni and donors should take great pride in," says Ramona Graves PhD '82,

head of the Petroleum Engineering Department and dean of the newly formed College of Earth Resource Sciences and Engineering (see p. 14). "Our department has always been one of the best. To have one of the most state-of-the-art buildings is only fitting."

Designed by the architectural firm Bohlin Cywinski Jackson (known for designing the Apple store on 5th Avenue in New York and Pixar Animation Studios in Emeryville, Calif.), Marquez Hall and its high level of finish are a testament to the generosity of the Mines community. After an historic \$10 million challenge grant from the Marquezes in 2005, more than 200 alumni, friends and corporate

The entire campus benefits from the newly opened Marquez Hall, designated as the home of the Petroleum Engineering Department, but containing a wing with nearly 24,000 square feet of general classroom space.





partners donated the remaining \$17 million needed to complete the project.

“Alumni are appreciative of the education they got out here. Their companies love our graduates—they hire them,” says Graves. “Because of this we’ve been able to do some really great things.”

A 23,600-square-foot wing of Marquez Hall was financed through student fees and will be used by the campus as general classroom space. The rest of the 87,400-square-foot building has been paid for with private donations, making it the largest privately funded construction project on campus in decades.

BEAUTY AND FUNCTION

Marquez Hall is both user-friendly and energy efficient, earning LEED Silver certification. The 63,800 square feet of computer classrooms, laboratories, research centers and informal gathering areas feature desks with multiple plug-ins, group study areas equipped with large tables and frosted panes of glass for dry erase boards, and water bottle filling stations that dot the hallways.

A key component of the building is the 3D visualization lab, a large room with theater-style seating, where students wear 3D glasses and virtually fly through petroleum reservoirs.

“Petroleum engineers work 1 mile, 5 miles, maybe even 10 miles into the ground. We can’t see where we work,” says Graves. “When students can actually plan a well, step back and see where it’s actually going to go, see how it’s actually going to intersect the geology, that’s huge.”

—David Tauchen

Check out a video and more photos of Marquez Hall in Web Extras at minesmagazine.com.

MINES ACHIEVEMENTS BY THE NUMBERS

1 STUDENTS

This year’s incoming class is the largest in the school’s history. It was selected from a larger applicant pool than Mines has ever received (12,500) and the group’s average SAT score is higher than any preceding class. It also includes the largest number of women enrolled in a single semester—298.

One of the most interesting statistics helped contribute to the large class size: Among those who received an offer to attend Mines, a considerably higher percentage accepted that offer compared to previous years. The goal was to enroll about the same number of students as last year (969), but this shift in behavior resulted in an influx of 1,066 new students.

Why the change? Positive press about the school, the high starting salaries of graduates, and research are all likely factors, as is the elevated interest in STEM fields seen nationwide. Expansion of scholarship programs and other economic factors are also likely to have contributed. But whatever the causes, Mines now has 4,000 undergraduate students enrolled—more than at any point in the school’s history.

If you haven’t heard about Mines making headlines, you probably aren’t getting our monthly e-newsletter. To ensure you stay connected with Mines and your fellow alumni, visit minesalumni.com/update and update your email address.



Lauren Urban

The largest freshman class ever to whitewash the M hiked up Mount Zion on August 20; women comprise 28% of the incoming class.

1300 Average SAT score of this year’s incoming students—highest in school history

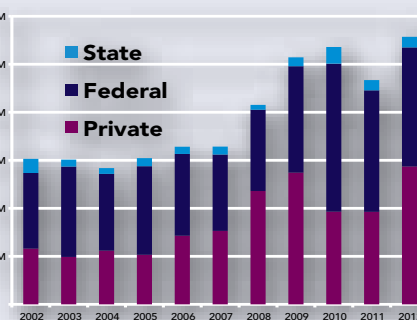
298 Number of women enrolling at Mines for the first time this fall—the previous record was 270

60% New students who graduated in the top 10% of their high school class—the highest number on record

2 RESEARCH

A new record was also set in 2012 for research funding. Commenting on the \$55.7 million figure—up from \$47.6 million in 2011—Vice President for Research and Technology Transfer John Poate says, “We are in the right place at the right time with a very talented faculty. We are winning major research awards from the federal agencies and industry across the whole spectrum of our research portfolio.” He points to water and the environment, unconventional oil and gas,

Source: Office of Research and Technology Transfer, CSM



Mines research funding, 2002–2012

solar energy, and strategic and critical minerals as areas that have gained national prominence. Poate adds, “Our long-lived industrial consortia and centers provide strong underpinnings for our research infrastructure.” And the numbers support these claims. In the last decade, research funding from private sources grew 146%, federal funding expanded by 47%, and state funding declined 25%.

3 PHILANTHROPY

At the end of a record-breaking year in giving, the Mines endowment stood at \$204 million—double its 2002 value. The numbers tell the story:

\$32.6M Total value of private gifts and commitments received during the 2011–2012 fiscal year—more than in any previous year

3,251 Total number of donors who gave to Mines during 2011–2012

34 New scholarships and fellowships created during 2011–2012

4 RECRUITING



218

The number of companies who participated in Fall Career Day 2012—the school's largest career fair ever (60 companies were on the waitlist).

Tyson Brown



Chelsea Panoos

The W. Lloyd Wright Student Wellness Center officially opened on September 14.

5 CONSTRUCTION

In addition to the opening of Marquez Hall, the 10,192-square-foot W. Lloyd Wright Student Wellness Center was opened on September 14 with a ribbon-cutting ceremony. Named after the former Mines physician (pictured, seated), the \$3.2 million facility caters to a variety of student wellness services, including medical and dental clinics, disability services, and personal and therapeutic counseling.

We added up the building space created by capital projects from the last two years (Marquez, Brown and Maple Halls, and the wellness center) and the tally comes to roughly a quarter of a million square feet, or 4.5 football fields. Yup, that's another record.

And speaking of football...

6 SPORTS

The 2011–2012 school year saw the Orediggers climb to new heights: They won the Rocky Mountain Athletic Conference All-Sports Competition Cup for the first time, hosted the NCAA Division II men's basketball tournament (also a first), and qualified for post-season play in an unprecedented 13 of 18 sports.

Mines athletics is also venturing into new territory with an ambitious fundraising initiative—a campaign to raise \$21.3 million in private support for the Clear Creek Athletics Complex, which was kicked off with anonymous private commitments of nearly \$9 million. The capstone project will benefit more than 70% of Mines student-athletes, as well as coaching staff and game-day spectators. It includes the Mines Athletics Center, which features:

- Marv Kay Stadium at Campbell Field—a 5,000-seat, ADA-compliant football stadium
- locker rooms for track and field/cross country and football
- training and sports medicine facilities, as well as office and event space
- facilities that accommodate intramural and club sports

Also included in the initiative are updates to the soccer field area (a press box, concessions and restroom facilities) and improved lighting for the track and field complex.

To learn more about Clear Creek Athletics Complex, visit giving.mines.edu/bigwin.



Design by DLH Architecture; rendering by Architectural Arts

Completion of the Clear Creek Athletics Complex is targeted for fall 2014.

RESEARCH

Computer Models Tell Watery Martian History

After NASA's 2001 Opportunity rover found rocks containing salt that formed in a watery environment on the planet's surface roughly 3.7 billion years ago, the agency's next objective was to try to understand more about the planet's climate history.

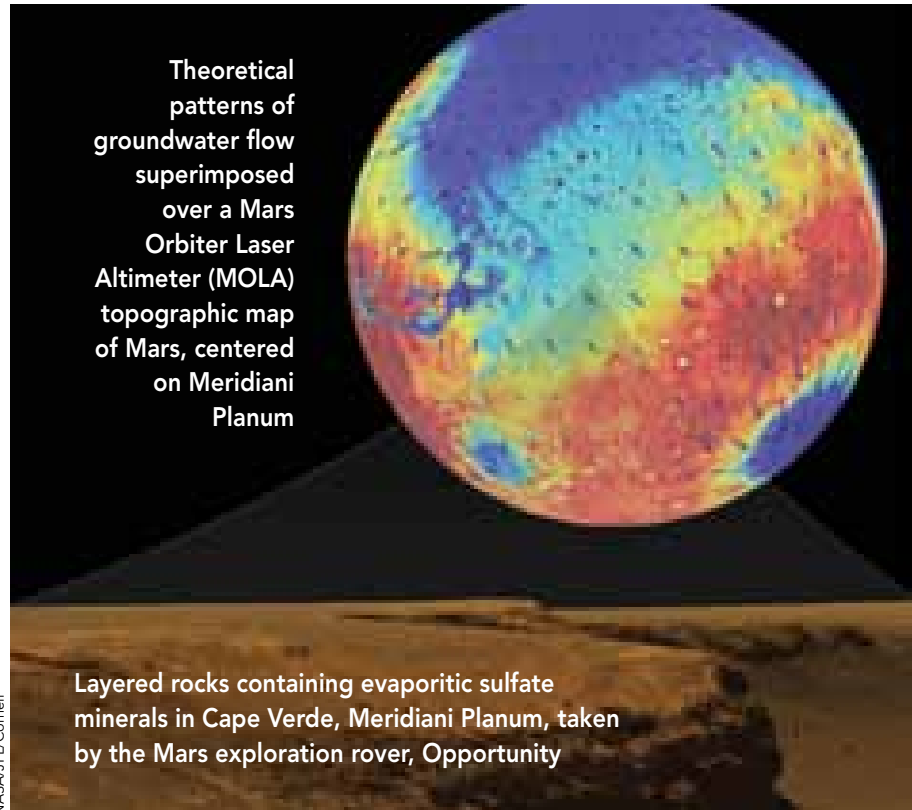
This is where Mines Geophysics Assistant Professor Jeff Andrews-Hanna came into the picture. He used computer models of groundwater flow to understand Mars' watery past. His models were able to predict where these salty deposits formed, and to explain what those rocks are telling us about the climate of Mars at the time.

Now he and his group are using models of the climate and groundwater of Mars to understand a mound of sediments in Gale Crater, the target of the Curiosity rover that landed on the red planet in early August. Andrews-Hanna's role is outlined in the Feb. 5, 2012 edition of *The Chronicle of Higher Education*: "Jeff is really state-of-the-art right now," says Steven Squyres, a professor of astronomy at Cornell University and lead investigator of the Mars Opportunity rover mission. "We use water on Mars as a sort of proxy for habitability, for evidence that the planet once could have sustained life, so it's really important. Jeff has brought a little physics into this work, and he is able to make predictions about water flow. We use those, in part, to guide our explorations. The rovers and the orbiters are the field geologists on Mars. Jeff is the theorist who brings their observations together."

The nature of Mars' early climate remains a controversial topic, as highlighted in a recent *Nature News* article featuring an interview with Andrews-Hanna. Debate continues between viewpoints of early Mars as a comparatively warm and wet place, or a cold and dry planet not very different from its present-day state. Research both at Mines and elsewhere will



Tom Cooper, Lightbox Images




NASA/JPL/Cornell

continue to push closer to an answer.

These days Andrews-Hanna has more and more help at Mines with those observations. His Planetary Geophysics Lab is attracting graduate students interested in researching the tectonic and geodynamic evolution of the red

planet, its groundwater flow, its crustal structure, its moon, and the structure of the impact basins.

—Marsha Williams

 This is an edited version of an article first printed in *Energy and the Earth* 2012. More articles from that publication can be found at newsroom.mines.edu.

FACULTY SPOTLIGHT

Illangasekare Accepts Henry Darcy Medal

On the Mines campus, Tissa Illangasekare is known as the friendly, upbeat civil and environmental engineering professor who transformed the old Volk Gymnasium swimming pool into a state-of-the-art soil and climate wind tunnel. It's a snaking, wooden test facility, where researchers study the transport of water from soil into the atmosphere and other important problems such as detection of buried land mines and leakage from sequestered CO₂.

But beyond campus—even across the world—Illangasekare is known for transforming the field of hydrology. That's why in April of this year he received the Henry Darcy Medal from the European Geosciences Union, one of the highest honors of the field. He accepted the medal at the EGU General Assembly in Vienna, Austria, where he delivered the lecture, "Let us Keep Observing and Play in Sand Boxes."

"I consider it a tremendous honor and achievement to receive this medal named after Henry Darcy, the renowned 19th century scientist, groundwater hydrologist and civil engineer," says Illangasekare. "This medal not only recognizes my contributions to hydrological sciences and water resources engineering, which was only possible with the help of many of my outstanding students, colleagues and collaborators in the U.S. and around the world, but

also service to the hydrological community and society in general."

The EGU award announcement states, "Illangasekare is the best experimentalist in the area. He is a leading expert in the integration of innovative experimental work with sound theoretical research. His work has continuously improved fundamental understanding of behavior and fate of non-aqueous phase liquids [NAPL] in heterogeneous porous

"Illangasekare ... is a leading expert in the integration of innovative experimental work with sound theoretical research."

direct impact on the lives of many people. In the wake of the Asian tsunami in 2004, Illangasekare raised funds to clean up wells and set up emergency sanitation

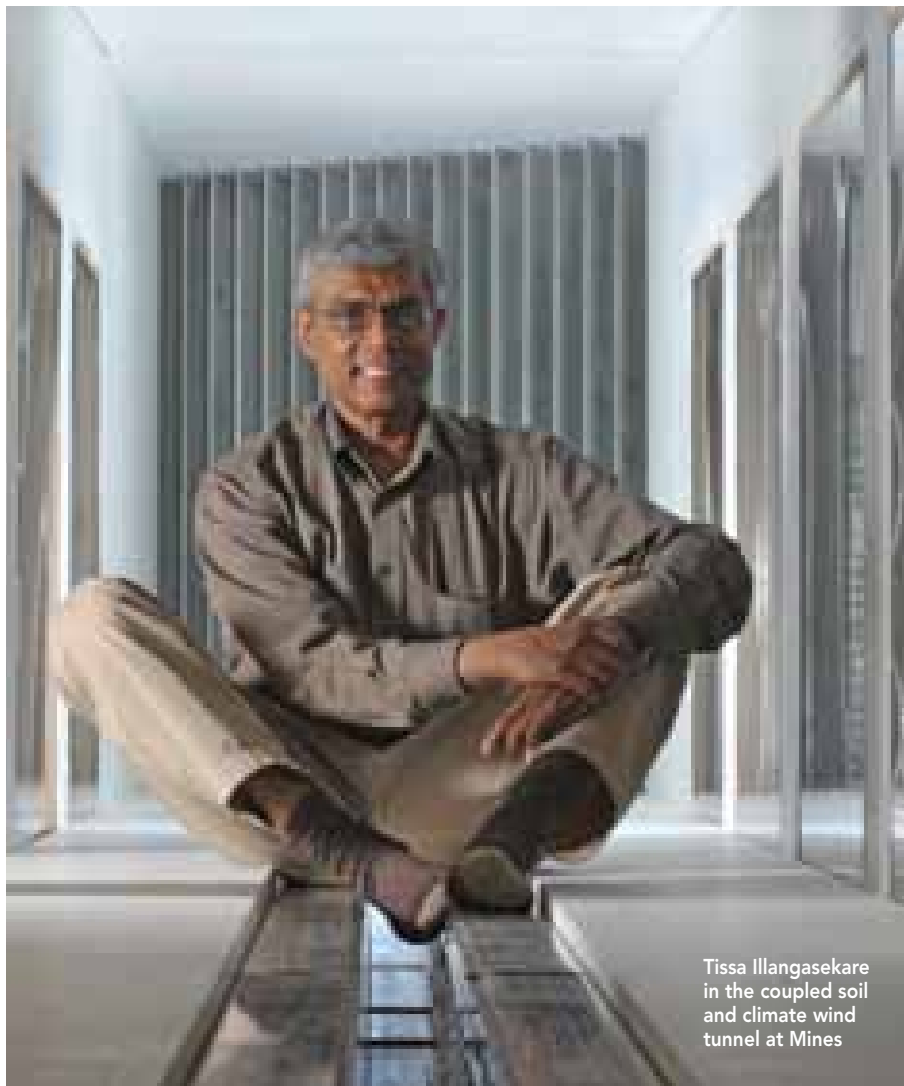
media. Illangasekare has made pioneering contributions to quantifying mass transfer from entrapped NAPL sources of contamination to groundwater."

These contributions not only improved science, but also had a

systems in the affected areas. He also directed a National Science Foundation-funded team of experts who traveled to Sri Lanka to identify groundwater supply problems and support the cleanup of wells.

At Mines, Illangasekare holds the AMAX Distinguished Chair of Civil and Environmental Engineering and is the founding director of the Center for Experimental Study of Subsurface Environmental Processes.

—David Tauchen



Tissa Illangasekare in the coupled soil and climate wind tunnel at Mines

Thomas Cooper, LightBox Images

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CAMPUS COMMUNITY BUILDING

Common Interests Build Common Bonds



Freshmen Katrina Ward (right) and Katie Schumacher made friends with each other and the rest of their group during a school-sponsored backpacking trip before the fall semester began.

The week before fall semester began, freshman Katrina Ward joined a four-day backpacking trip along the Colorado Trail with seven classmates, her future resident assistant and two guides from the Mines Outdoor Recreation Center. Part of a program aimed at enriching the transition from high school to college, the trip was their first organized activity.

Perhaps the biggest challenge the group encountered was a turn in the weather; a light rain fell most of the second day, dampening their spirits, along with everything else. “We were sopping wet and freezing,” recalls Ward. Rather than stop for lunch, Adam Ahnhut, the designated trip leader—such roles rotated each day—made the decision to keep moving toward the campsite, where dry clothes, a meal and hot chocolate quickly revived their spirits. By the time the students climbed into the van to return to campus, a tightly knit group had formed.

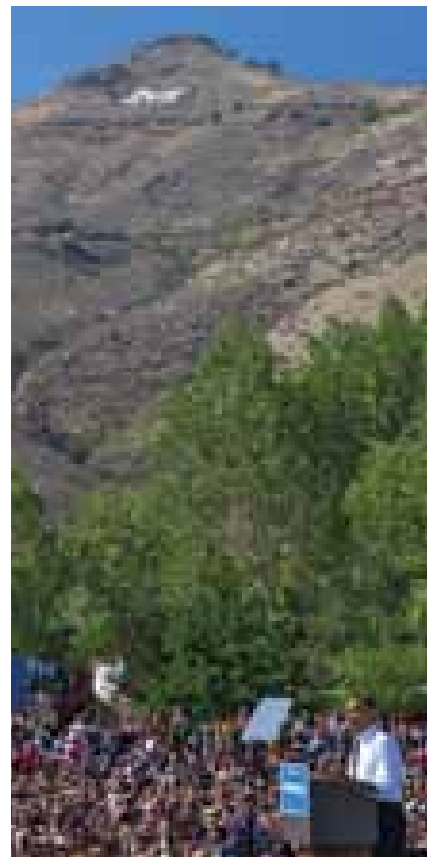
On a ropes course south of Golden the next day, the backpackers got to meet (and learn to trust) the 29 other freshmen with whom they’d be sharing the second floor of Maple Hall for the remainder of the academic year. It was a great way for the students to come together. “The group felt totally integrated by the end of the day,” says Ahnhut.

Named the Adventure Leadership Community, students on Maple Hall’s second floor make up one of four such communities established this fall as part of a program that groups freshmen in dorms based on common interests. The three others are Visual and Performing Arts, Service and Social Justice, and Women in Engineering.

If the measure of success is establishing trust and strong relationships, then the program is off to a great start. “All four communities gelled almost immediately,” says Brent Waller, director of housing and residence life, who has co-led the initiative with Katie Schmalzel, residence life coordinator.

Is this unusual? Ward thinks so. “I have some friends who, for the first week and a half of school, didn’t get to know anyone in their dorm except for their roommates. I knew everyone on my floor before classes even started ... It’s a very positive environment.”

—Nick Sutcliffe



CAMPAIGN STOPS President Obama spoke to a crowd in Lions Park on September 13, just minutes from the Mines campus. The event took place a few hours before a Romney campaign event a half-mile away in downtown Golden headlined by Mitt Romney’s son, Josh. According to his campaign staff, the President’s visit was the first time a sitting president had visited Golden since Ulysses S. Grant.

STRUCTURING THE SCHOOL

Two More Colleges Formed at Mines


One year on from the formation of the College of Engineering and Computational Sciences, Colorado School of Mines has formed two more colleges, composed of the remaining departments on campus.

Formed on August 1, the College of Applied Science and Engineering includes the departments of Chemical and Biological Engineering, Chemistry and Geochemistry, Metallurgical and Materials Engineering, and Physics. Tony Dean, W.K. Coors Distinguished Chair of Chemical Engineering, is the college’s new dean (yes, that makes him Dean Dean). And on September 6, the College of Earth Resource Sciences and Engineering was announced. It encompasses Mining Engineering, Geology and Geological Engineering,

Petroleum Engineering, Geophysics, Liberal Arts and International Studies, and Economics and Business. Ramona Graves PhD ’82, professor and head of the Petroleum Engineering Department, has begun a two-year appointment as dean for this college.

Provost and Executive Vice President Terry Parker describes the goal of forming the colleges as helping to maintain “programs of distinction, where the education and research opportunities offered by the colleges and departments are well known within these fields, produce enhanced reputations and ultimately generate a flow of quality students and research programs that place us in the top tier of institutions.”

—Amie Chitwood



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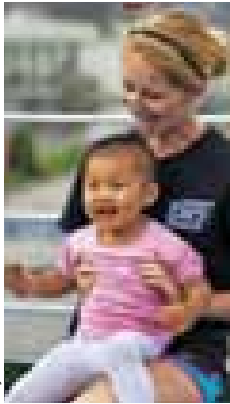


Human Energy®

SUMMER DIARIES

McBride Reveals Cultures, Focuses Goals

Fulfilling one of the requirements of the McBride Honors Program in Public Affairs led these two students into unfamiliar territory this summer. Katie Huckfeldt, also the editor of *The Oredigger*, spent 26 days in China; Katie Williams worked for six weeks on an archeological dig in the Southwest. Here's a snapshot of their experiences.



Roy Stillwell

KATIE HUCKFELDT

Senior, environmental engineering

Where: Dalian, Yantai, Qufu, Tai'An and Beijing, China

Why this trip: I couldn't pass up such a fantastic opportunity offered through the McBride Program!
Moment of significance: Standing on top of Mount Tai and looking out above the clouds is something I will never forget.

Most important thing packed: A good book—we spent a lot of time traveling.

What's different now: The Chinese cherish family and personal virtue above all else. Coming home, I

took these values with me and try to better myself and my relationships with friends and family each day.

How to take this back to Mines: I realized the importance of culture in relation to engineering. To be successful you often have to know the community you serve.

To read Katie's article from *The Oredigger* about her experience, go to minesmagazine.com/huckfeldt.



Lee Drake

KATIE WILLIAMS

Junior, chemical engineering

Where: Chaco Canyon, New Mexico

Why this trip: I'm interested in pursuing archeology in graduate school—in particular, organic and chemical residue analysis of archeological artifacts.

Moment of significance: Finding a

Pueblo point while hiking off trail on survey [pictured].

Most important thing packed: My sleeping pad (the ground was really hard) and my trowel.

What's different now: Before I attended this field school, I saw the world as sort of black and white, in that engineers do certain things and other majors do other things. Now I know that engineering and archeology can and do go hand in hand.

How to take this back to Mines: I'm more excited about my major now, because I know the classes will help me on my way to becoming an archeologist.

For the adventures of another McBride Honors student, whose journey began this summer and will extend throughout her junior year, read Kate Rooney's blog, "German for a Year," under Web Extras at minesmagazine.com.

WOULD YOU HAVE GUESSED?

36% Percentage of bachelor's degrees awarded to women by the Petroleum Institute in Abu Dhabi in January 2012 (60 out of 167)

25% Percentage of bachelor's degrees Mines awarded to women in May 2012 (181 out of 721)

Heard a surprising fact lately? Send it our way: magazine@mines.edu



Tyson Brown

FOURTH IN THREE IN A ROW

Kayla Johnson and her team placed fourth overall at the 2012 International Rope Skipping Federation's World Championships event in August in Tampa, Fla. Individually she placed fourth in consecutive triple-unders. Johnson, a senior studying metallurgical and materials engineering, has been skipping rope with the Jumping Eagles Competitive Jump Rope team since first grade and participated in her first international event at age 12 in the 2004 championships in Australia.



Courtesy of Kayla Johnson

A REASON TO LOVE THE WIND.



THE MINES FUND FUELS YOUR EDUCATION

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Engineering a QUANTUM LEAP in Solar Power

Over the last 25 years, a series of incremental improvements to photovoltaic cells have raised efficiency levels from around 15 percent in the early '80s to 20 percent today. However, after recent research at Mines helped confirm the effectiveness of quantum dots, scientists believe this new technology could elevate efficiency to 40 percent over the next 10 years.

By Lisa Marshall
Diagrams courtesy of Mark Lusk

Take a look at a solar panel on a sunny Colorado day and, if you're like most people, you won't see much more than a blinding glare. Mark Lusk sees wasted opportunity.

"I see that glare and feel how hot the panels on my roof get and say, 'What a waste! We're losing energy!'" says Lusk, a Mines physics professor and solar energy researcher, who admits to checking out his panels and their energy output more than most. On a clear day, he explains, only a fraction of the photons hitting the photovoltaic cells on his roof are converted into electricity—the rest bounce off as light or are lost as heat. On a cloudy day, or as dusk approaches, the long-wavelength, low-energy particles of light are scarcely enough to produce any juice at all. On average, just 20 percent of the sun's rays actually get converted to energy in a contemporary solar cell.

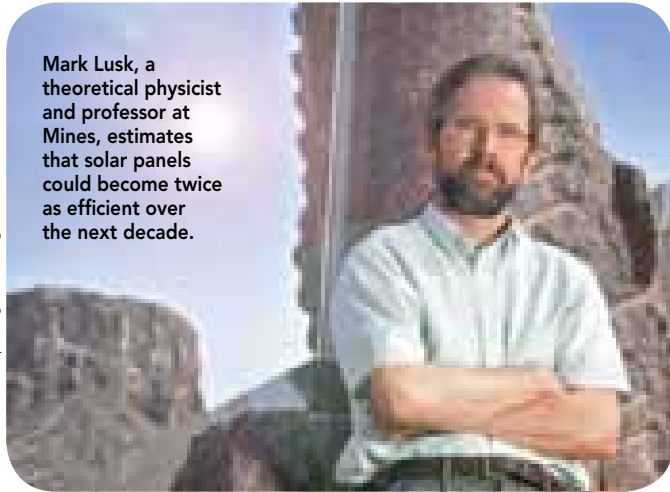
"In terms of efficiency, there is a lot of room for improvement up there," he says.

Fueled by a six-year, \$12 million grant from the National Science Foundation, Lusk and his colleagues at the Renewable Energy Materials Research Science and Engineering Center (REMRSEC) have spent the last four years working to improve that efficiency via a complex merging of nanotechnology, quantum physics and computational wizardry known as "exciton engineering."

The nascent and controversial field hinges on the manipulation of "excitons"—the combination of an excited electron and the hole from which it is dislodged by an incoming photon.



Mark Lusk, a theoretical physicist and professor at Mines, estimates that solar panels could become twice as efficient over the next decade.



In conventional photovoltaic cells, the exchange is generally one-for-one; upon impact, a photon creates an exciton, which sends a highly energized electron racing into an electrical circuit.

However, by using nano-sized light-absorbing particles called “quantum dots,” researchers believe they can create a micro-environment where excitons—which, for much of the day, absorb considerably more energy than is needed to get just one electron into an electrical circuit—go on to share excess energy, dislodging other electrons to create more excitons. Called multiple exciton generation (MEG), scientists now believe this approach could more than double the amount of electrical energy converted from strong sunlight on cloudless days.

Along with figuring out how to make more electricity from strong sunlight, Lusk is also exploring a parallel technology that could make better use of weak sunlight on cloudy days, when lower-energy photons produce excitons that lack the zip needed to create the required voltage. Using an outside-the-box molecular design called energy pooling, he believes they can coax several weaker excitons to combine their energy into a smaller number of higher-energy excitons, creating useful current.

“People often think of quantum mechanics as weird science,” says Lusk, seated in front of a huge monitor showing a cluster of atoms and electron clouds. “But we are exploiting just that spooky physics to engineer materials with vastly improved energy conversion efficiencies.”

SIZE MATTERS

Photovoltaic cells have been around since the 1930s and still operate on basically the same principal: Particles of light, a.k.a. photons, hit the cell and nudge electrons to move to a higher energy state, “like if you had a stack of oranges and pulled one out and put it on the top, leaving a hole,” explains Lusk. The electron and its hole are together called an exciton, and they need to be sent in opposite directions through an electrical circuit. That’s the current that powers your kitchen stove or flat screen.

How Conventional Photovoltaic Cells Work

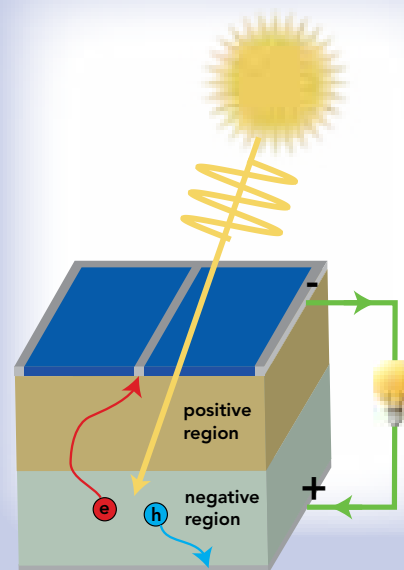
Almost all photovoltaic cells used today rely on the remarkable properties of silicon to generate electricity. When a photon from sunlight is absorbed by a silicon atom, it causes one of its electrons to move up into a higher energy level, creating a “hole” on the atom where it had been residing. Electrons on neighboring atoms are able to shift over to fill this hole, leaving a new hole on the atom they just left behind. In this way, both the electron and hole are able to wander freely through the material. While the pair—together referred to as an exciton—remain linked briefly, the energetic jiggling of neighboring atoms ultimately separates them.

A silicon crystal with any number of highly energized electrons and corresponding holes jumbled together generates no electricity unless the two can be sorted. Herein lies the magic of the photovoltaic cell.

In a procedure called doping, trace amounts of particular impurities are added to silicon to create an electrostatic charge: Doping with boron causes silicon to take on a negative charge; doping with phosphorous makes it positive. If a slice of crystalline silicon is carefully doped to make the top layer

positive and the bottom layer negative, an electric field forms where they meet.

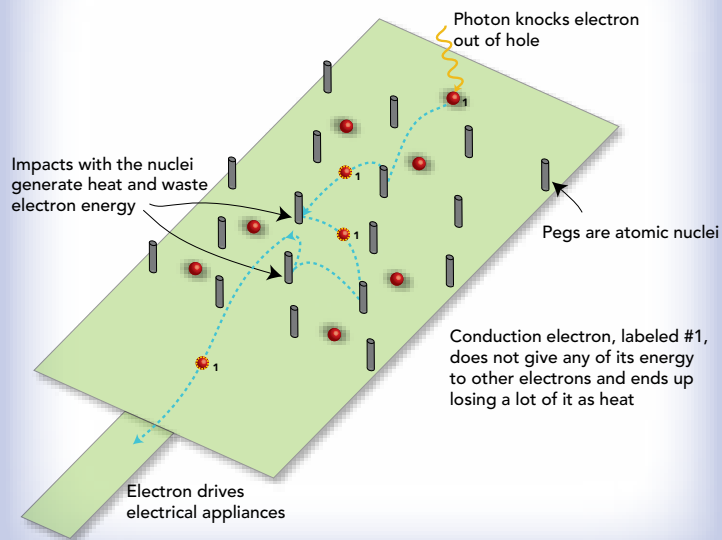
This electric field performs the critical sorting function needed to generate electricity. Electrons encountering the field are swept off into the negatively



charged region, while holes are swept into the positively charged region. Metallic leads then conduct electrons on the negative side into a circuit, where the current can be put to work powering electrical devices. Ultimately, the circuit returns electrons back to the positively charged side of the cell, where, having returned to a lower energy level, they recombine with the holes.

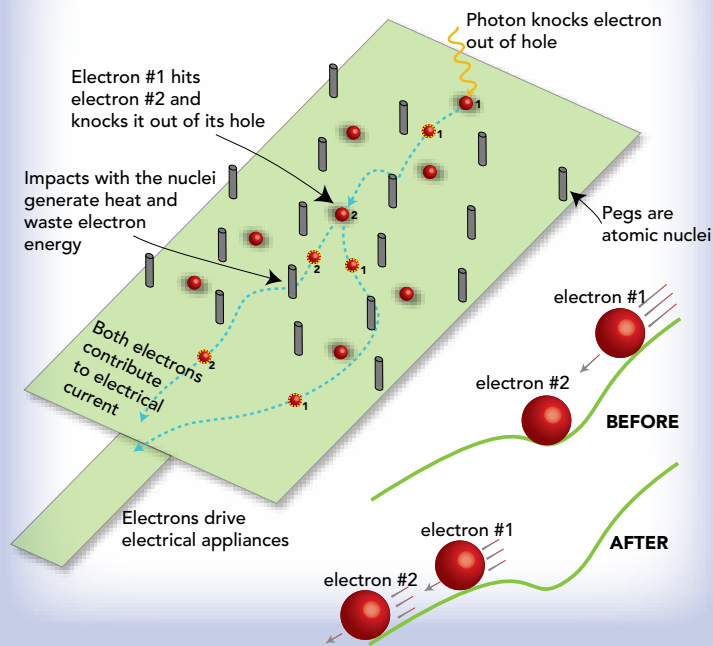
—Nick Sutcliffe

Conventional Exciton Generation



A simple pinball table is a helpful analogy for understanding exciton behavior and engineering. A ball in motion at the top of the incline corresponds to an electron that has absorbed energy from a photon. In a conventional photovoltaic cell, the ball rolls to the bottom and passes through the gate—one photon sends one electron into an electrical circuit, and it ends up bouncing around and losing a lot of its energy along the way.

Multiple Exciton Generation



With MEG, the first ball knocks one or more other balls into motion on its way down the incline, so one photon ends up sending two or more electrons into a circuit.

For years, most PV cells have been made of silicon, and improvements in efficiency have been incremental—0.05 percent here, another 0.1 percent there. But a decade ago, scientists began to wonder if much larger strides could be made via what Lusk calls a “game-changing paradigm shift.”

“They said, ‘Maybe we can take a high-energy exciton—from that powerful particle of light that puts the orange way up high on the stack—and somehow use some of its energy to grab another orange [electron] and pull it toward the top too ... we would end up with two holes and two excited electrons out of one piece of light.’” The extra energy from that powerful particle of light that would have just been wasted as heat is now turned into electrical current.

The key, researchers proposed, was to make the cell material out of infinitesimally small nano-crystals, which prompt the squeezed electron/hole pairs to behave differently than they do in bulk material—the quirky quantum confinement that Lusk loves to study.

As far back as 2000, researcher Arthur Nozik of the National Renewable Energy Laboratory (NREL) in Golden, Colo., predicted that MEG using quantum dots could boost efficiency of solar cells to as much as 65 percent, but the idea was slow to catch on.

“Most people thought it was an interesting idea, but nobody really took it seriously,” says Matt Beard, a senior scientist who arrived at NREL in 2003 and has been researching MEG ever since.

In 2004, scientists at Los Alamos National Laboratory in New Mexico became the first to actually observe MEG

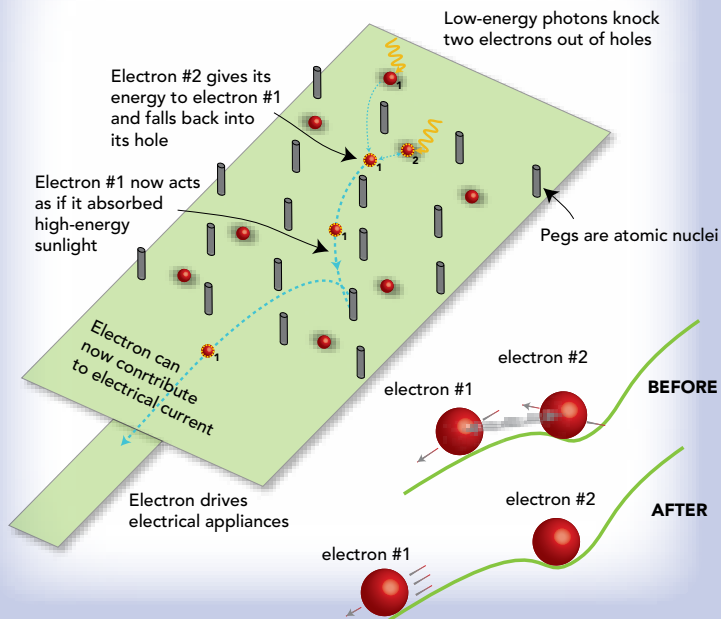
in action in quantum-confined materials. Soon after, some scientists were reporting that as many as seven exciton pairs could be created with one photon. But other research questioned whether nano-sizing the material made any difference.

Enter Lusk, his colleagues Alberto Franceschetti and Zhibin Lin, and a suite of high-powered computational tools, and it appears that the controversy has been settled at last. By performing a large number of “computational experiments,” they were able to see exactly how electrons, holes and photons interact in quantum dots of various sizes, providing an explanation for how MEG works and why it gets better as the dots get smaller. The bottom line is that the dot size determines what excitons are most easily split up, and small dots split up their favorite excitons the best.

“It’s really unusual behavior that just comes from how we package the same old materials. The key thing is to create a thin film that, if you look closely, is full of very tiny particles,” says Lusk. Since the findings were published in a landmark paper in April 2011 in the journal *ACS Nano*, it’s energized the whole field of MEG research.

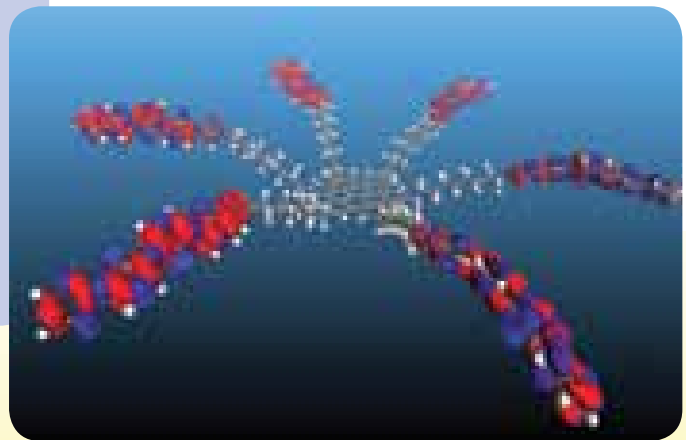
“We can sit here as experimentalists and measure a bunch of materials, but the problem is, first you have to make the material, and then you have to make the measurement. That takes time,” says Beard. “It is very useful when a theorist can first say, go look at X shape or Y composition. What Mark and his colleagues did at Mines was show that there is, in fact, an effect [in using quantum dots]. He helped push the theory forward.”

Energy Pooling



Energy pooling can be thought of as combining the energy of two slow-moving balls into one more rapidly moving ball. This corresponds to two weak photons creating two moderately excited electrons that pool their energy into one high-energy electron.

“The idea is to make a solar cell that you could put in places where there isn’t a lot of sun, or where the atmosphere is really thick.”



Lusk’s computational research involves literally designing molecules atom by atom. The molecule he’s working on above is intended for low-light PV generation. Lower-energy photons are absorbed on the “legs” of the spider-like structure; the resulting excitons (red and blue) are then launched into the middle, where they are pooled to create a single higher-energy exciton.

MAKING ONE WHERE THERE ARE TWO

Since then, experimentalists at Mines, NREL and elsewhere have been applying the quantum dot idea to various materials, including silicon, with promising results. In December 2011, Beard published a paper in *Science* showing that a solar cell made of lead selenide quantum dots produced two to three electron-hole pairs per incoming photon. “It works, but we are still not there yet,” says Beard, noting that there are many steps between producing multiple excitons inside a cell and making more power.

Meanwhile, Lusk is back at the computer, working on a theoretical model of a new spider-like molecule designed to absorb lower-energy photons on its legs and launch the resulting excitons into its center, where they would pool to create a single higher-energy exciton—just the opposite of MEG. “The idea is to make a solar cell that you could put in places where there isn’t a lot of sun, or where the atmosphere is really thick,” he says.

He is also looking at ways to “extend the dance” between the hole and the electron inside a quantum dot, allowing them to hop through the material together before finally splitting them apart to make current. This would make the solar cells even better because the excitons could then be pruned apart in a separate piece of material that does that very efficiently. To do this, he’s taking a cue from leaves, where excitons are able to hop inexplicably long distances en route to specialized centers for making sugar.


“In most materials, the dance fizzles out fast, but plant leaves somehow keep it alive,” Lusk explains. “They really

have this whole quantum transport thing figured out, and I want our solar cells to do that, too.”

Elsewhere in the REMRSEC labs, scientists are taking such basic science and moving it forward, working out ways to incorporate materials made of those tiny dots into thin sheets of solar cells, which could someday be easily and cheaply applied to American homes and office buildings.

“If you look at the diversity of skills we have in this center, it’s incredible. We have physicists, chemists, materials scientists, chemical and mechanical engineers, and applied mathematicians all coming together to work on this,” says Craig Taylor, REMRSEC’s director. “We are an absolute leader in this area.”

So just how efficient could solar panels get over the next decade if this all works out?

“Forty percent is probably a really good number to shoot for now,” Lusk says. “If we could double the efficiency of solar panels, that would be like doubling the number of solar panels on the planet. Then the panels on my roof could power my house *and* charge an electric car. It would be huge.” 

After 64 years, two alumni tell the story behind the unsolved theft, and reappearance, of a 1,200-pound bell belonging to University of Colorado Boulder.

By Robert S. Benchley

Boulder Bell Heist: Miners Break 64-year Silence



It was a cool, dry Colorado night in Boulder on Tuesday, October 12, 1948. The first-quarter moon had set by 2 a.m., and nobody saw the panel truck with the large rear door—a style of vehicle often used by bakers for deliveries—back up to the northeast entrance of the University of Colorado’s Men’s Gymnasium. A nondescript grey Ford with out-of-state plates stopped out front near the sweeping front steps. Stepping from their vehicles, 18 nervous young men took up their positions.

The object of the mission: To retrieve a cast bronze bell inside the gym that, according to campus legend, had hung in the bell tower of Guggenheim Hall on the Mines campus until a group of CU students had removed it. Now on display as part of an ornamental seating installation in the gymnasium lobby, the bell’s presence on campus was an insult to Colorado School of Mines, and the young students were here to take it back. All that stood between them and the bell was a locked door and a night watchman who patrolled the building.

A WORLD WAR II OPERATION

The events that followed have remained a well-kept secret for 64 years, but on condition of anonymity, two individuals recently agreed to share details with *Mines*. Both are now over 80 and, although they may not have the spring in their step that they had as undergraduates, retelling the story brings back smiles that somehow restore their youth. The older of the two, whom we refer to here as “Mike,” is a member of the Class of ’50 and attended Mines after serving in the Navy during World War II. The younger, referred to below as “Tom,” was recruited as a lookout; a member of the Class of ’51, he came to Mines straight from high school,

This photo ran in the October 3, 1950, edition of *The Oredigger* three days after the bell was found at dawn, deposited on the lawn west of Guggenheim Hall. The two students photographed are Douglas Streit '51 and Larry O'Brian '51 (both deceased).

which made him an exception in the group.

“It was a World War II mission all the way,” says Mike with a laugh. “There were lots of veterans on campus then, and another veteran and I planned it. We began by making a number of trips to CU to observe security for the building. It was locked up each night, but we found there were lots of places a man could hide just before closing. That way, we would have someone on the inside to let us in. We also observed the night watchman’s routine and found it was the same every night, including when he took his meal break.”

Mike had already led an attempt to retrieve the bell in late September. Joined by some veterans and younger students—about a dozen in all—they headed for Boulder, equipped with tools and a two-wheel dolly.

“All was going as planned, and we had just

removed the bolt holding the bell in place, when the security guard came right through the front door,” Mike recalls. “We grabbed up our tools and ran for the truck.”

Though they came away empty-handed, the would-be thieves had learned that

the bell was much heavier than they had estimated. “We waited several weeks for things to quiet down,” says Mike, “and we went back with more big guys, a stronger, four-wheel dolly, a better collection of tools and some wooden planks.” And something else: more lookouts.

“That’s when I got involved,” says Tom. “I was recruited two



days before the second attempt, partly because my car wouldn't stand out. The students I brought scattered around the building and found hiding places. Another guy and I hid in the bushes by the front door. If there was any trouble, I was supposed to run around to the back door to warn the others. I remember leaving my keys on the floor of the car in case I wasn't able to escape."

When they arrived, a student, who had hidden in the building before it was locked up that evening, gave them the OK signal by shining a flashlight through a window. Once inside, the crew set to work. This time, everything went according to plan—almost. They unfastened the long bolt, shifted the 1,200-pound bell onto the dolly and rolled it out to a loading dock. "We got the bell out the back door and partway into the truck, but it turned out to be about an inch wider than the truck's rear door," says Mike, recalling the urgency of the moment. The engineering solution they came up with: brute force. "We gathered more guys and gave the bell a big push." The sides of the truck expanded outward and the bell scraped through. In all, the operation hadn't taken much more than 30 minutes.

The young men hopped back into their vehicles and drove away from the sleeping campus into the black Colorado night. "We stuck to back roads on the way back to campus to avoid police patrols," says Mike, "but I don't think we passed more than one car the whole way."

It was a wise precaution. According to the CU student newspaper, *The Silver and Gold*, the theft was reported to the Boulder Police Department at 2:43 a.m., only a few minutes after they stole away along a narrow road that still runs along the north side of Folsom Field.

When the students got back to Golden, they decided that the old clay pits would be the best place to keep the bell until they could proudly announce its return in a day or two.

But that proud moment was not to be.

COVERING TRACKS

All too familiar with the dimensions and heft of the bell, it didn't take long for Mike to realize that the bell they had taken could never have hung from the cupola atop Guggenheim Hall. They hadn't retrieved their own bell; they'd stolen one that belonged to CU.

When the investigation into the theft began, the long and intense rivalry between the two schools made Mines students obvious suspects. Colorado had been victorious over Mines in a football game the previous Saturday; perhaps the stolen bell was payback for the loss. Several CU search parties, official and

unofficial, combed the Mines campus and parts of Golden, all to no avail.

In addition, if Mines students were found to be responsible for the theft, it would be intensely embarrassing to the administration; they would have no choice but to expel those responsible.

"That threat hung over our heads until graduation," says Mike. "The next phase of our mission was keeping everyone quiet." And their success in this respect is almost as remarkable as pulling off the heist. Recent history may have played a role. "Those of us who were veterans were used to the concept of not sharing secrets," says Mike. "Over the next few months, I would hear rumors of people—myself included—who had supposedly been involved. Some were true, some untrue." But as far as Mike knows, none of these rumors was pursued by the administration. "Whatever they may have believed, the administration never came out and accused anyone. Gradually, it just died down."

That is, until Saturday, September 30, 1950, when the bell reappeared on the lawn behind Guggenheim Hall as mysteriously as it


had vanished. Slightly worse for wear, it was caked with clay and had a large "M" carved in its side.

Mike had graduated the previous spring, but he had been contacted by younger veterans who wanted to remove the bell from hiding before they graduated. He gave his blessing, and in a second stealth operation, a group of students borrowed a truck from a geology professor and moved the bell from the clay pits to the Guggenheim lawn, making time for the engraving on the way.

After the bell's reappearance, CU officials immediately called to make arrangements to retrieve it, but in a bit of spirited rivalry of their own, Mines' administrators asked CU to prove that the bell was their property before allowing them to take it back to Boulder.

It was more than 10 days before CU finally found an original receipt showing it had been cast by Van Deuzen and Lift Company in Cincinnati in 1877 and installed in the belfry of the campus' original building, Old Main, in 1878. The original bell to be hung there, it rang out for class changes and athletic victories. Ironically, it had been cracked during some overzealous ringing following a football victory over Mines in 1926, which is why it ended up on display in the men's gymnasium. No one knows how the story of it being stolen from Mines got started.

Today, the bell rests in Boulder, installed in CU's Heritage Center on the top floor of Old Main, only a couple dozen feet from where it was first installed 134 years ago. The "M" carved in its side remains plainly visible.

Editor's note: For an account of how this story came to light, read Editor's Take, p. 6. 



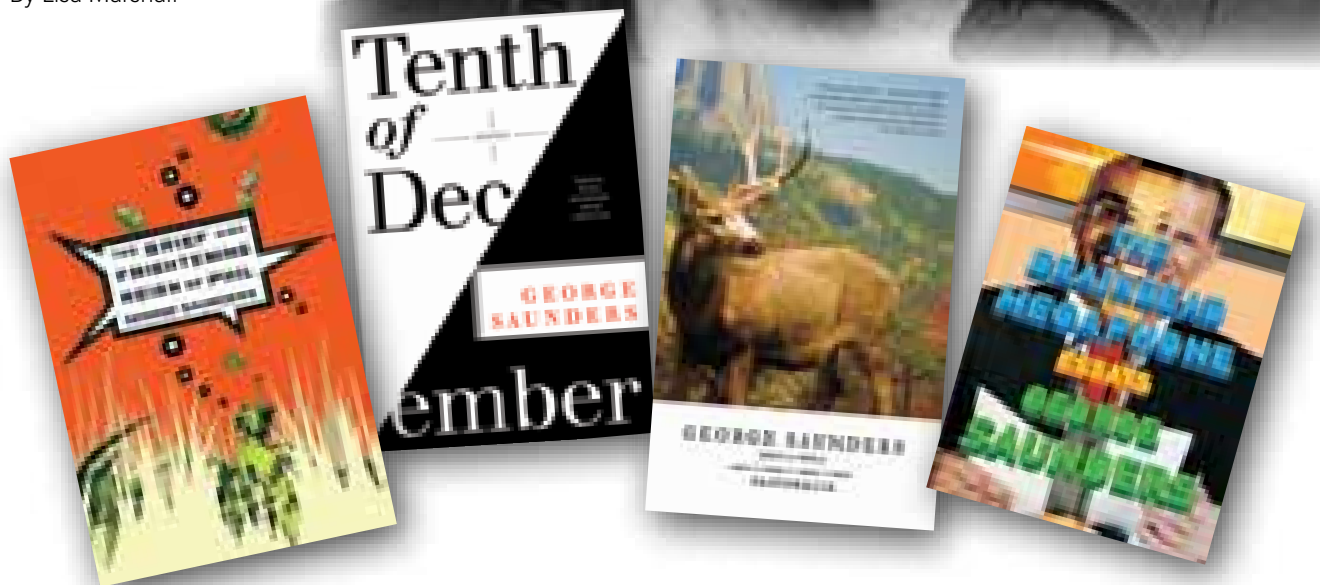
Courtesy: CU Heritage Center

Folsom Field, University of Colorado at Boulder, 1948

Exploring Human Landscapes

George Saunders '81 earned a degree in geophysics from Mines, but it turned out he was more interested in probing human culture and society with words than revealing the Earth's subsurface with technology. Now a renowned author who has been lauded by peers such as Garrison Keillor and Thomas Pynchon, Saunders shares how Mines prepared him for the rigors of writing.

By Lisa Marshall



W

When he spotted the monkeys relieving themselves in the murky river in which he was swimming, George Saunders realized he'd made a big mistake. It was 1982 in the jungle of Sumatra, and the fresh-faced Mines geophysical engineering grad was a year and a half into his first (and what would be his only) job as a field geophysicist. He'd had a few too many and was taking a nighttime swim:

"I'm paddling along and see about 200 of them sitting along our oil pipeline," he recalls in a warm South Chicago accent that hints at his roots. As monkey feces plopped into the river ahead, warning bells sounded. "I'm thinking, 'I wonder if swimming here is okay?' Turns out it was not."

For the next seven months, Saunders would struggle with a mysterious Simian virus that left him feeling, as he puts it, "chronically hung-over and about 90 years old." He opted to quit his job, return to the states and curl up with some Kerouac and his journal. By the time he felt better, he'd made a realization that had been percolating for years. He didn't want to be an engineer at all. He wanted to be a writer.

"I always loved reading and I loved writing, but it never occurred to me that I could do it for a living," he says. "I always felt like it was just a guilty pleasure that I indulged."

Fast forward three decades and Saunders' ill-fated swim, and the radical career change it led to, have served him well. At 53, the quick-witted, self-deprecating father of two boasts six critically acclaimed books; frequent bylines in *The New Yorker*, *GQ* and *Harper's Magazine*; and a teaching gig at Syracuse University's MFA program—one of the nation's most prestigious creative writing programs.

In 2001, *Entertainment Weekly* named him one of the top 100 most creative people in entertainment. In 1999, he was included

in the "20 Under 40" fiction issue of *The New Yorker*, which features 20 young writers described by the magazine as capturing "the inventiveness and vitality of contemporary American fiction." And in 2006, he was awarded both a Guggenheim Fellowship and the coveted MacArthur Fellowship, a.k.a. the "Genius grant"—a \$500,000 five-year grant bestowed upon "talented individuals who have shown extraordinary originality and dedication in their creative pursuits."

Not bad for a working-class Midwestern kid who never

planned on going to college.

"I had terrible grades and my parents hadn't gone to college. It just wasn't something you did," he says. "But then a couple of teachers saw something in me and steered me in a new direction."

One of those teachers was a geologist, who suggested Mines. After taking the advice, Saunders encountered brutally high academic standards and a rigorous workload that he says helped to prepare him for life as a professional writer.

"No one studied as hard as I studied, but I still got C's," he says, noting that the "good effort" that got him by

in high school wasn't enough. "The rigor of the place was mind-blowing, and that was great training for writing. You can do 40 drafts, but if it sucks it still sucks. It taught me an intense sense of responsibility for whatever I produce."

Even in college, Saunders remembers stealing away to the fiction corner of the Mines library and losing himself in Fitzgerald and Faulkner. One Sunday, when he was supposed to be studying for a full day of exams, he got sidetracked reading Ernest Hemingway's "Farewell to Arms."

"I looked up and it was 8 p.m. and I'd read the whole book," he recalls.



In preparation for writing a piece for *GQ*, in 2007 Saunders spent a week traveling in Africa with Bill Clinton, visiting the young beneficiaries of an HIV-drug distribution program the former president had helped sponsor.

“ [Mines] taught

me an intense

sense of

responsibility

for whatever

I produce.”

SUCCESSFULLY OUT OF STEP

Upon graduation—at the peak of the '80s oil boom—he was presented with three job offers. (“Even a dope like me could get work in the oil fields at the time,” he quips.) And off he went: a new college grad who had never been out of the country heading for a jungle camp in Sumatra, a 40-minute helicopter ride from the closest town.

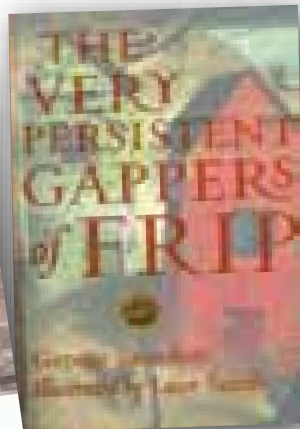
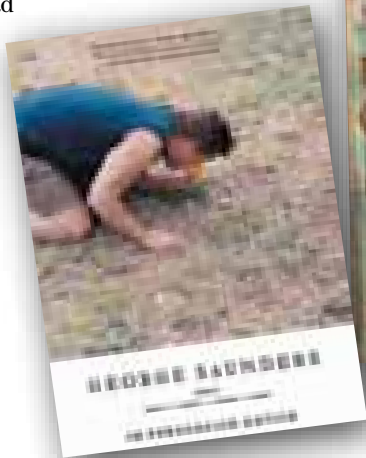
During his first year on the job, for every four weeks spent working, he'd spend two weeks traveling—to Thailand, Russia and Pakistan. He says it provided an incredible political and moral education, and embedded a lust for travel and a curiosity about new cultures and politics that would serve him later as a writer.

“Sure, I was probably meant to go to school for English. But there is something about being out of step with my environment that I really like,” he says. “At Mines, I wasn't spending time the way most writers of my generation were spending their time—at Ivy League schools studying literature. In ways it has helped me. Whatever I am doing, I am always coming at it a little crosswise because of my engineering degree.”

Saunders' early days as a writer were not easy. First, he traded his engineer's income and jet-setting lifestyle for odd jobs—as a doorman, a groundskeeper, a convenience store clerk, a slaughterhouse worker. In the mid-1980s, he was accepted to Syracuse University's Creative Writing Program, where he met his wife, proposed to her three weeks later, and quickly started a family. Then he spent years as a technical writer, sneaking 15 minutes here and there to work on his short stories.

In 1992, having mailed several manuscripts to *The New Yorker*, he got word that the magazine wanted to publish his science fiction short story, “Offloading for Mrs. Schwartz.” Later published in the book, “CivilWarLand in Bad Decline,” the story is about a man who works in “personal interactive holography” helping people experience the memories of others through dream-like holograms.

It was the break most fiction writers only ever dream about; at age 32, Saunders had arrived.



EXPANSIVE SCOPE

Look at his body of work today and the range is remarkably broad. In the viscerally disturbing sci-fi short, “Escape from Spiderhead,” he tells a tale of convicts who have pharmaceutical ports implanted under their skin and serve as remote-control guinea pigs for corporate agents doing psychotropic drug testing. In a 2007 journalism piece in *GQ*, he warmly describes the week he spent with Bill Clinton, visiting the young beneficiaries of an HIV-drug distribution program the former president had helped sponsor in Africa. And “Field

Study: Tent City, U.S.A.” is a 2009 *GQ* piece that describes the week Saunders spent living incognito in a homeless camp in Fresno, Calif.; at once comic and tragic, the experience is narrated in the voice of (appropriately) a scientist:

The project methodology was simple. The Principal Researcher would set up a tent within the tent city and observe the inhabitants....

Coincidence? Not really, says Saunders. In reality, writing and science aren't so far apart.

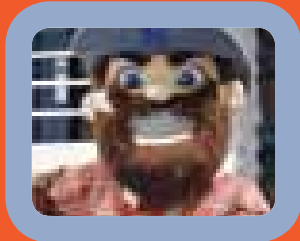
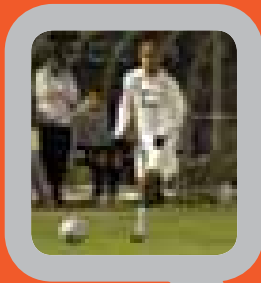
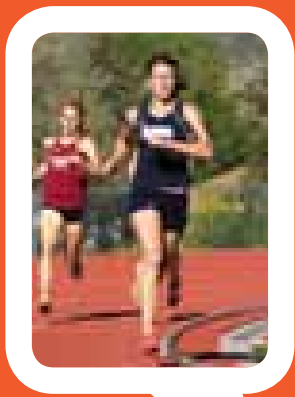
“When you are undertaking a science experiment, you don't really care how it comes out as long as you get one step closer to the truth, right?” he explains. “In writing, you take a similar approach. You start writing story A and halfway through it isn't working, so you turn it into story B, and so on. That openness is also something I learned at Mines.”

Critics tend to call Saunders a satirist—a pigeonhole he doesn't care for. His writing is often both funny and critical, but others point out where it goes beyond satire.

“The most impressive thing to me about his work is how profoundly compassionate it is,” says Cheryl Strayed, a former student of Saunders' and author of *The New York Times* best-seller, “Wild.” “Even when he is being hysterically funny, the final punch is always an emotional one.”

In the end, Saunders says, his intent isn't to make people laugh or cry or to change the world. He just wants them—for a minute—to see the world in a different, more humane light.

“When that happens,” he says. “I think writing can make the world a little less lonely.”



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MINES

ALUMNI NETWORK

ALUMNI ADVENTURES

Miners Playing Hard

Colorado School of Mines alumni had several opportunities over the last few months to stretch their legs and comfort zones with fellow Miners, most notably a rafting trip through the Grand Canyon and a cruise around Iceland's magnificent coastline.



Ron Wolf '69

GRAND CANYON: MAY 21–27

Ron Wolf '69 was one of 28 brave boaters who floated, hiked and camped in the Grand Canyon this spring with Steve Sonnenberg PhD '81, professor in the Department of Geology and Geological Engineering, and the Charles Boettcher Distinguished Chair in Petroleum Geology. Wolf recalls, "I was introduced to the Vishnu Schist, the Zoroaster Granite and the rest of this fabled section of the Grand Canyon in Berthoud Hall quite a few decades ago and have wanted to go down to the Inner Gorge ever since. The opportunity to make that trip with a group of geologists, geophysicists and other Miners was irresistible. At one point while we were headed downriver, an outfitter tried to point out a bit of wreckage from a plane crash high on the canyon wall. It wasn't easy to pick out until one of the alums said to look at the top of the Redwall Formation. Who else would locate a plane crash by placing it in the stratigraphic section? And who else would get the reference? It was that kind of trip."

ICELAND—LAND OF FIRE AND ICE: JULY 20–28

Sonnenberg also led a group of 20 on a seven-night cruise along the coast of Iceland, where they saw brilliant glaciers, steaming volcanoes, Viking ruins and some sophisticated geothermal technology.

GET INVOLVED

If you'd like to participate in alumni association activities and haven't seen our invitations, we may not have a way to reach you. Visit minesalumni.com/update to ensure we have your current email address.



Valerie Pool



Don't miss the stunning collection of photos at minesmagazine.com/2012alumniadventures.

ALUMNI ASSOCIATION

Meet the Colorado School of Mines Alumni Association Board of Directors

Have you ever wondered what the CSMAA board does? In this second of four installments, we highlight each director and his or her service to the alumni community.

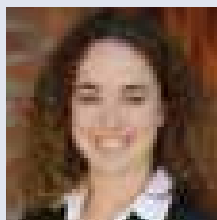


Paul Roamer MS '97
Evergreen, Colo.

Treasurer

Paul's 20+ years in operations management—from large casting manufacturing plants in the aerospace market to start-up ventures, including distributed wind manufacturing—have given him special skills in overseeing CSMAA finances. His expertise is in project management, materials, products and process engineering, as well

as design for manufacturability and concurrent engineering. He earned a master's degree in materials engineering from Mines and a bachelor's degree in manufacturing engineering from California State Polytechnic (Pomona).



Paula Nolan '05
Littleton, Colo.

Director, Young Alumni Engagement

Paula focuses on increasing participation among alumni who graduated from Mines within the last 10 years, and on facilitating the transition from student to career professional. She earned her bachelor's degree in electrical engineering from Mines with a minor in political affairs through the Guy T. McBride Honors Program, and is now a

sales engineer with Siemens Industry, working with many different levels of the construction industry. She is currently enrolled in an MBA program with Colorado State University.



Raymond Priestley '79
Dallas, Texas

Director, Admissions

Raymond received bachelor's and professional degrees in geological engineering from Mines and later earned an MBA in finance from the University of Tulsa. Most of his career has been focused on upstream oil and gas, exploring and developing both conventional and unconventional resources throughout North America. For 15

years, Raymond was involved with the school's admissions department, traveling with and helping secure funds for Mines' Discover and Preview programs, exposing high school students and their families to the value of a Mines education.



Cooper Swenson MS '04
Golden, Colo.

Director, Professional Development

Cooper's role is to assist alumni needing to develop networking, career transition, management, leadership and entrepreneurial skills, which he's been doing in a different capacity since 2006 as part of The Lunch Bunch—a small group of alumni who meet monthly in Golden. He earned his master's degree in chemical engineering from

Mines, but switched to solving financial problems instead of engineering ones, and now serves individuals, families and entrepreneurs with long-term financial planning.



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James R. Larsen '65
President-elect

Jafar Tabaian '00
Secretary

Paul Roamer MS '97
Treasurer

Anita Pariseau
Executive Director

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Darek Bruzgo '95

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Mohan Misra PhD '86

Paula Nolan '05

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Matthew Showalter '99

Cooper Swenson MS '04

Mahesh Vidyasagar MS '00

William Warfield '75

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303-273-3583 (fax)

csmaa@mines.edu
minesalumni.com



Find full bios for board members online at minesalumni.com/board. Interested in getting involved with the alumni association? Learn about the opportunities at minesalumni.com/volunteer.





Chelsea Panos

STUDENT SUPPORT

Colorado native and Mines sophomore Alyse White was awarded the Duane J. and Marcine M. Fritz Scholarship in spring 2012. Administered by CSMAA, the scholarship was established by Duane Fritz '51, who died in 1999, and his wife, Marcine, who died in 2008. The first Fritz Scholarship award recipient, White received \$10,000 in assistance. She is studying petroleum engineering with a minor in geology; Fritz earned a professional degree in petroleum engineering with a minor in geology, and stated that the scholarship may be

awarded to a Colorado resident majoring in either discipline. White has also kept up a healthy interest in liberal arts: As a high school senior, she captained the first team of all-female participants in the Department of Energy Regional Science Bowl and, determined to show that "debaters can be engineers," she continues to judge high school speech and debate tournaments. She joined CSMAA as a student member last year and is also a member of the American Association of Petroleum Geologists.

LIFE MEMBERS

The Colorado School of Mines Alumni Association gratefully acknowledges its new Life Members, welcomed between January 1, 2012, and August 31, 2012.

- Chapel Allen '84
- Shannon '99 and Dawn '98 Ambrosio
- Douglas Beahm '74
- Steven Chonka '08
- Jeffrey Covington MS '12
- Elliott Dudley '09
- Keith Engler '94
- Justin Gale '02, MS '03
- Adam Hanna '08
- Hilary Hurst '12
- Jess Kindler '98
- Jared King MS '09
- Kendra '96 and Raul '98 Lema
- Blase Leven MS '89
- Jeannette McGill MS '07, PhD '10

- Matthew Mientka '06, MS '10
- Sandra Mobley '01
- Henry Obermeyer '76, MS '79
- James Parry '93
- Travis Sauers '11
- Benjamin Seling '11
- Kathleen Smits PhD '10
- Sarah Tudor '09
- Michael Varco '99
- Christopher White '94
- Julie D. White '93
- Dean L. Willis '88
- Mark E. Zitterich '89
- Benjamin '11 and Sydney '10 Zywicki

To join this exclusive group of more than 990 Life Members of CSMAA, visit minesalumni.com and click on "Join Now."

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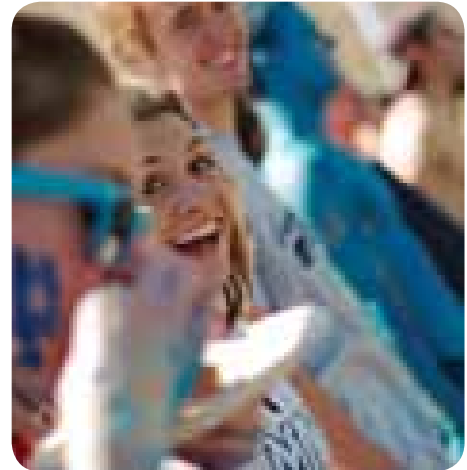
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REUNIONS Alumni Weekend, the year's biggest event for reconnecting with classmates and the campus, is funded in part through membership.

COMMUNICATION Membership dollars keep you in touch with the campus and alumni communities, bringing you *Mines* magazine, newsletters and targeted email communications.



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COLORADO SCHOOL OF MINES

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CLASS NOTES

1949

Alvin Shames is adjunct faculty for Long Island University and lives in North Bellmore, NY.

1954

In early 2011, **Edward Charles Burgan** and his wife, Phyllis, attained the ACBL (American Contract Bridge League) rank of Gold Life Master.

1959

Kenneth C. Russell is a professor emeritus of metallurgy and nuclear engineering for Massachusetts Institute of Technology and lives in Lexington, MA.

1961

Paul Lafleur is a president for Petro-Find Geochem based in Saskatoon, SK, Canada.

A. Frank Mayadas is a senior advisor for Alfred P. Sloan Foundation and lives in Chappaqua, NY.

Laurence G. Preble is a principal for Flintridge Properties and lives in Boulder, CO.



LIFELONG TEACHING David R.

Cole '52, MS '56, former president of the alumni association (1973) and a CSMAA Distinguished Achievement Medalist (1982), retired this spring after 44 years with the Colorado Mining Association Education Foundation. Dave had been involved with CMAEF since its beginning, serving as manager for its first summer course in 1969 and later as president and secretary-treasurer.

1965

Raymond J. Claxton is a regional operations manager for Engineering Systems in Dallas, TX.

Richard T. Todd is the president of Mohave Gold Mining & Exploration and lives in Soulsbyville, CA.

1969

Khaled S.M. Buhamrah is a managing director for Kuwait Petroleum based in Safat, Kuwait.

J. Douglas Pitts is the president and CEO of Pitts and Associates and lives in Anthem, AZ.

Raymond Stewart 📷

1971

Jerald E. Jones is the president of N. A. Tech and lives in Golden, CO.

Daniel R. Walton is a senior coal advisor for Wood Mackenzie in Annapolis, MD.

1972

James E. Dionisio is SVP, energy tubulars for MRC/McJunkin Red Man and lives in Tulsa, OK.

1973

David P. Conover is an associate for Agapito Associates and lives in Denver, CO.

John S. Eulich is the chairman/CEO of ASPEQ Holdings and lives in Saint Louis, MO.

Paul B. Leidich is a director for Leidich Mining Solutions.

Gregory Staff 📷

1974

Charles A. Dowdell is a director of solid waste services for the City of Waco, Texas, and lives in McGregor, TX.

1975

A. Charles Anderson is a VP marketing for Forest Oil and lives in Denver, CO.

John D. Fix is a senior project controls cons. for Science Applications International and lives in Broomfield, CO.

Wayne L. Gladfelter is a professor of chemistry and associate dean for academic affairs for the University of Minnesota and lives in Saint Paul, MN.

Daniel Krygowski 📷

1976

Howard E. Janzen is the president and CEO of Cool Planet Energy Systems and lives in Leawood, KS.

1977

Claudio D. Manzolino is a senior geological advisor, field development, for Baker Hughes and lives in Houston, TX.

Russell R. Opfer is the CEO/chief geophysicist of Lockhart Geophysical and lives in Wheat Ridge, CO.

1978

Tariq Ahmad 📷

Joseph Kuchinski is VP of operations for DCP Midstream and lives in Windsor, CO.

Michael Ryan 📷

1979

Daniel R. Burns is a research scientist, EAPS for Massachusetts Institute of Technology and lives in Duxbury, MA.

David H. Holstein is the president of Victory Oil & Gas and lives in Mabank, TX.

Anthony M. Meyers is a senior director of safety, training and workforce planning for Luminant Mining and lives in Frisco, TX.

Michael E. Shade is a Rocky Mountain sales manager for Peak Completions and lives in Broomfield, CO.

1980

Taher A. Al-Sahhaf is a professor for Kuwait University based in Safat, Kuwait.

Thomas J. Boersig is a product development scientist for Chevron and lives in Pittsburg, CA. 📷

David Holligan is a country manager for Chevron and lives in Houston, TX.

Thomas E. Jorden is the chairman of the board of directors of Cimarex Energy and lives in Centennial, CO.

Margaret E. Parnell is a project executive for ExxonMobil and lives in Clifton, VA. 📷

Herminio Passalacqua is a consultant for Kuwait Oil based in Ahmadi, Kuwait.

Richard Simonson 📷

Theodore D. Steichen is a policy advisor for American Petroleum Institute and lives in Washington, DC.

Robert R. Vogel is a VP, strategy and business development, for Vulcan Materials and lives in Saint Charles, IL.

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Editor's Note: Alumni from the classes of 1981 to 2012 who have recent updates online or have uploaded photos to minesalumni.com over the last four 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

Timothy A. Deines
Mary R. Halstead
Dawn M. Krupp
Michael J. McCormick
Robert S. Vincent

1982

Bryan K. Allery
Daniel R. Boltz
Dwight A. Burford
Robert J. Manelis
James A. Rice
Michael J. Richen
Sean S. Schantz
Marcus T. Wichmann

1983

Leonard A. Eros
Virginia Gent
Todd R. Habliston
Sean P. Kelly
Michael J. Leap
John L. Saxton
Jonathan S. Schultz
Thomas P. Young

1984

W. Chapel Allen
Kimberly A. Legg
Christopher A. Ruff
Scott D. Ryan
John R. Tuttle
Jeffrey K. Warmann

1985

Larry Arnold
Glen J. Mizenko

1986

Thomas C. Bergeon
S. Scott Gutberlet
Eric S. Isaacson
Peter J. Kaczkowski
Gregory E. McIntosh
Roger E. Peterson
Gregory E. Wolfe
Jeremy Zimmerman

1987

Ali Elkamel
Laurie M. Flanigan
Dana K. Greathouse
Dale E. London
Steven J. Shattil

1988

Brian V. Alphonso
Rachid Ben-Slimane
Bruce G. Karr
Michael G. Medberry

1989

Christopher R. Brown
David A. Ellerbroek
J. Alec Gimurtu
Thomas M. Haard
Tom R. Hergert
Michael D. Irvin
Michael P. Long

Steven D. Sparkowich
Deidre Ann Taylor

1990

Eugene F.A. Barker
Michael P. Castelli
Keith L. Cooper
Deborah Kang Gentzen
Jeffrey J. Jacoby
David C. Lawler

Claudia Renee Milliken
Janet L.J. Peace
Robert A. Todd Jr.
Michael von Saldern

1991

Adel Elsharkawy
Michael G. Fryer
Joseph H. Katz
Blaine S. Neptune

Daniel E. Prairie
Jeffrey T. Ranney

1992

Sanggono Adisasmito
Bader E. Al-Attar
Bader Ahmed Al-Saad
Fahad D. Al-Sabah
Victoria B. Jackson
Nielsen
Kenneth J. Warn

1993

Mohammad A. Al-Gharaballi
Baqer A. Bahbahani
Gerald S. Grishaber
Michael Robb
Howard A. Roepnack

1994

Holly W. Bender
Keith Engler
Anthony L. Shouse
Dana Foreman Stephens

1995

Michael B. Beverly
Maria Angela Capello
Abdullah Al-Said
Ebrahim
James R. Gray
Kyle D. Knudson
Richard J. Murphy
M. MacLean Price
L. Scott Sanford
Brian C. Wiesner
Norio Yuki
Rabitah Zakaria

1996

Anwar K. Al-Mutlaq
Ahmad I. Al-Qattan
Jonathan M. Bloomfield
Gaye Eshima
Scott A. Goodwin Jr.
Eric J. Kline
Andrew C. Schneider
Joan Tilden

1997

Hamida A. Al-Ramdhan
Mohammad B. Al-Sahali
Osamah Alomair
Traci L. Case
Nathan O. Davis
Damien E. Harr
Michael S. Melzer
Aaron R. Ochsner
Elizabeth R. Reigles
Geary W. Smith Jr.
Jennifer A. Van Dinter

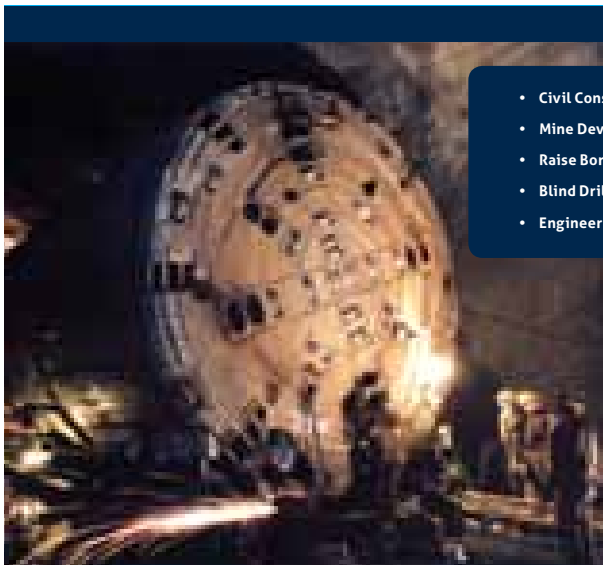
1998

Steven D. Adams



Chelsaa Panos

MINERS COME HOME A gorgeous fall Colorado homecoming weekend (September 28–29) welcomed back alumni, who had plenty of activities to enjoy despite the Orediggers' 54–28 loss to the Western New Mexico Mustangs.



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ALUMNUS PROFILE

Geotechnical Gold

Dennis Ferrera '72 is one of the stars of the 2012 Olympic Games. He spent two years in London getting ready, and he beat his expected times. His achievements: leading a team that prepared a 600-acre site for construction of the facilities where most of the athletic contests took place, safely excavating unexploded World War II ordnance, and inculcating a culture of safety among a diverse group of contractors.

"In 90 million person hours, we didn't have a single fatality," Ferrera says. "This is high-risk construction work, and people were killed during the building of the five prior Olympic sites."

It was an unusual assignment for Ferrera, who is the chief operating officer of the nuclear business unit at global engineering giant CH2M Hill, based in Englewood, Colo. Most of his career has been focused on Rocky Flats, where he began working in 1975. The London Olympics was his first major non-nuclear-related geotechnical project.

His company, however, is no stranger to the Olympics. CH2M Hill has been involved in the last five Olympic Games, starting with Atlanta in 1996, and is already signed up for Rio de Janeiro in 2016. The London project began in 2006 with the selection of CLM—a consortium of CH2M Hill and British firms Laing O'Rourke and Mace—to oversee construction.

Shortly after the deal was closed, Ferrera was asked to be the project manager ("programme manager" in British parlance) for the site preparation portion of CLM's overall contract, and shortly thereafter he moved with his wife and four-year-old daughter to London, remaining there from May 2007 until August 2009. "We really enjoyed it," says Ferrera. "My daughter, who was six when we returned to Colorado, even developed a bit of an English accent."

Given a budget of almost \$1 billion (10 percent of CLM's overall construction budget) and some challenging completion dates, work commenced and was well under way by midsummer 2007. "In all, we demolished 215 buildings," he says, "and completed 2.2 million cubic meters of earth work, both cut and fill. The area had been an industrial site since Victorian times, and there was a range of soil contaminants such as organics, arsenic, cyanides, sulphates and heavy metals. We removed material and



Courtesy of Dennis Ferrera

Dennis Ferrera moved his family to London for more than two years while he served as site preparation project manager for some of the major Olympic facilities constructed there.

cleaned it up using soil washing, stabilization, bio-remediation and in situ groundwater treatment."

One of their most unusual challenges was unearthing unexploded Nazi bombs found in the rubble that had been dumped there following World War II. "We used ground-penetrating radar and did sampling," says Ferrera. "Whenever we found one, we would notify the London police, who would then call in military ordnance experts to examine it. Fortunately, we never had any explode."

"At the stadium, we removed half a million cubic meters of earth and put back about 250,000 meters of crushed concrete."

By the time site prep wrapped up in 2009, his team had set the stage for construction of some of the buildings most familiar to viewers of the games—the Olympic Stadium, Velodrome and Aquatics Centre—and many more. "At the stadium, we removed half a million cubic meters of earth and put back about 250,000 meters of crushed concrete," Ferrera says.

He didn't return to London in August for the games, but enjoyed watching them from his home in Louisville, Colo. "I was proud to be one of the people who built the site," he says.

And rightly so: In addition to scoring well for safety, he excelled in two other key categories. "We came in ahead of schedule and under budget," he says.

All in all, a gold medal performance.

—Robert S. Benchley

Brandon K. Ahrens
 Salah Mudhi Al Mudhi
 Dawn M. Ambrosio
 Douglas B. Bailey 
 Daniel G. Burnett
 Duane J. Cleere
 Bader Y.A. Haider
 Jess L. Kindler
 Summer B. Montgomery
 Preston K. Reichert

1999

Khaled Al-Bader
 Mohammad A. Al-Bahar
 Mabkhout M. Al-Dousari
 Philip S. Marsh
 Zhaobo Meng 
 Andrew L. Olson
 Raphael R.G.M. Pieters
 Matthew J. Sands
 Eric L. Smith
 Robin L. Swank
 Michael A. Varco
 Alexis K. Woolf

2000

Naser Fadghosh Al-Hajri
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 Khalid A.D.H. Al-Zanki
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 Brendan T. Blake
 Belinda Y.
 Butler-Veytia 
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2001

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 Stephanie Stoeberl

2002

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2003

Fahad A. Al-Faresi
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2004

Ahmad Al-Bahar
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2005

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 Jolene Mulumba 
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 Donald D. Walker
 Jennifer A. Walker


2006

John Agee 
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 Michael L. Coors
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 Adam J. Meininger
 Aaron J. Oakley
 Christopher N. Ocker
 Jonathan M. Snyder
 Megan M. Starr
 Kevin M. Tate
 Kevin J. Weems

2007


Andrew F. Bairn
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 Kurang J. Mehta
 Pamela S. Mencin
 Allison L. Nold
 Joseph A. Romani
 Jonathan Sachen
 Robert P. Schiermeyer Jr.
 Henry E. Scott
 Katherine Muterspaugh
 Steele
 Kendra L. VanGorp
 Jeremy R. Wells
 Patrick J. Wright

2008


Geoffrey T. Bee
 Morgan K. Brown
 John M. Compton
 Nicholas D. Darschewski
 Mitchell Harsch 
 Stephen Immel 
 Almas K. Istayev
 Mariya Lein



DESERT GEOLOGY Alumni friends in Tucson, Ariz., most with degrees in geology or geological engineering (plus one rogue mineral economist), got together on July 28, 2012. Left to right are Chris Osterman PhD '99, Carl Eriksson MS '87, Doug Coleman '88, Ken Balleweg '79, MS '90, Lukas Zurcher '85, John Larson PhD '88, William (Bill) Oppenheimer MS '88, Silver Miller PhD '89, Keith Laskowski MS '87, J. Stevens (Steve) Zuker MS '87 and Lewis Kleinhans PhD '91.

Jami L. Morton
 Heather E. Pace
 Christopher Tipple 

2009

Alex S. Bentz
 Mark A. Cleveland
 Meghan A. Cozzens
 Amy E. Dubetz
 Kyle P. Gramly
 James D. Molde
 David Pruitt 
 Gregory C. Trickle
 Tory W. Vonburg

2010

Jaime L. Bromley
 Sana Choudhry
 Kelley A. Commeford
 Roxanna N. Frary
 Kelsey J. Gallegos
 Ferhat E. Koc
 Laura M. Lunsford
 Rachael E. Madland

Teresa A. Malesardi
 Anthony Montalvo
 Ashley A. Nagle
 Andrew S. Perdue
 Allison E. Satterfield
 Kathleen M. Smits
 Eric W. Sugano
 Greg Widgery 

2011

Gholam Abbas Angouti
 Kolucheh
 Jamie N. Berghorn
 Justin P. Blackman
 Jesse U. Dennis
 Jessica L. Garcia
 Christopher R. Harper
 Geoffrey N. Heller
 Christopher B. Johnson
 Kristine A. Lombardi
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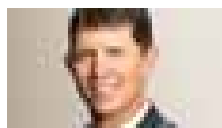
2012

Zahra H. Alskahin
 E. Clair Bergeson
 Adam R. Brady
 Michael D. Collins
 Joshua M. Currier
 Christopher Goutama 
 Travis A. Graham-Wright
 Taylor M. Heffner
 Christopher Horner 
 William Lambert 
 Jerel D. Miller
 Chelsea L. Newgord
 Michael R. Rose
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 Shane E. Schrader
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 1981



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 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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Crystal (Graham) Long, PE '80



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MINES ROTC ALUMNI

ATTENTION




CSM Dept. of Military Science has an ongoing project to maintain a database of past Mines ROTC students. If you have not already done so, please send a brief email to faguilar@mines.edu listing your name, the year you graduated and/or commissioned and what military branch you commissioned in. We would also enjoy knowing anything else about you, such as how long you served in the military, what you are doing now, etc. If you happen to be passing through, please feel welcome to stop in. The ROTC Cadre House is located at 1232 W. Campus Rd., Building 1, Golden.



Senior Class of 2012, thank you for making a significant impact for Mines this year.

Including President Scoggins' match, you raised \$15,531 – *the highest senior class gift to date* – for The Mines Fund and your academic departments. Your partnership as students, and now as alums, keeps the Mines spirit alive!

BATTLE OF THE MINEBOTS



THE MINES FUND

EQUIPPING LEADERS FOR THE FUTURE



GOODBYE, CUBICLE Ryan Sprackling '10 and Angela Bauer '11 left their jobs on July 31 for six months to travel around the country, "living wild and free," as the title of their blog states. Follow their adventures at livewildfree.wordpress.com.



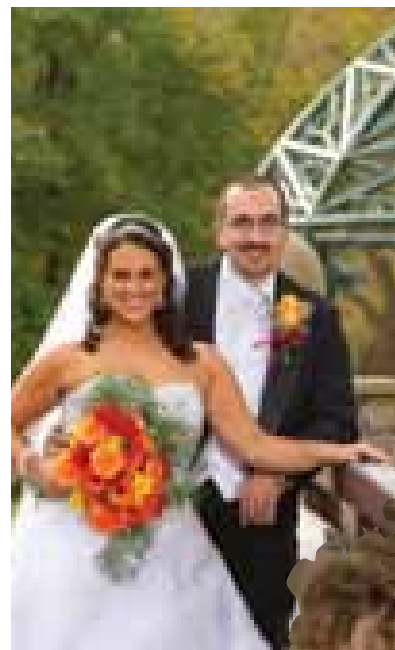
NEW BLUE-EYED MINER Aletheia (Ali) Elizabeth was born to Emily Bostwick-White '04 and Jesse White '04 on February 26, 2010, in Wheat Ridge, Colo.



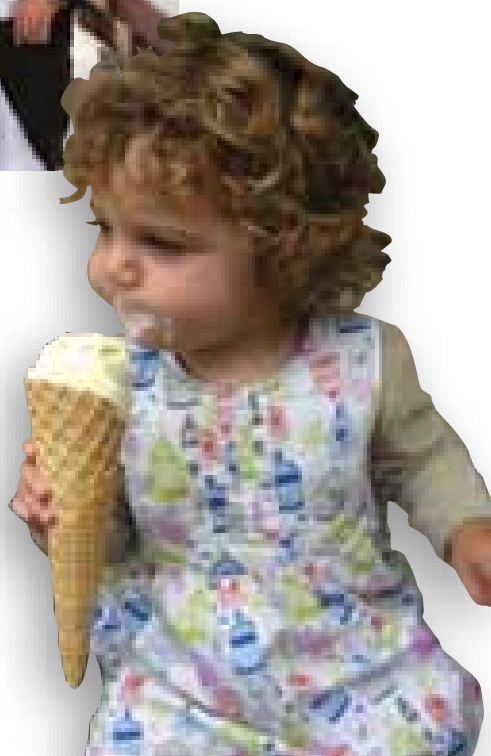
ANOTHER STAR Gavin Peter was born on March 28, 2012, to John '95 and Kelley Starritt, joining brother Mason (2). John works for the Colorado School of Mines Foundation.



SNOWY SPRING WEDDING Matt Nichols '09 and Mikayla Buenger '09 were married on May 19, 2011, in Evergreen, Colo., at the Evergreen Lake House with many Mines students and alumni in attendance. The couple now lives in Great Falls, Mont.



PENNSYLVANIA PAIRING Justin Beougher '09 and Rachael Rumberger were married October 29, 2011, at St. Peter Cathedral in Erie, Penn. Mines graduates in attendance included best man Jason Harms '09, as well as Jason '07 and Darcy '08 Stingerie.



GOOD AND MESSY

Amelia joined older brother Faisal (3) and parents Abdel MS '10, PhD '12 and Georgia Zellou on December 19, 2010.

THANK YOU

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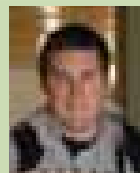
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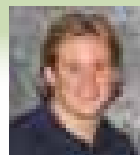
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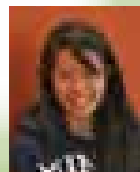
2011–2012 recipients:



Matthew Curt
Year: junior
Major: mechanical
engineering



Robert Kaetzer
Year: senior
Major: petroleum
engineering



Marisse Vista
Year: junior
Major: petroleum
engineering

Total raised in 2012:
\$56,250

Total donations to date:
\$386,325

Scholarship funds awarded to date:
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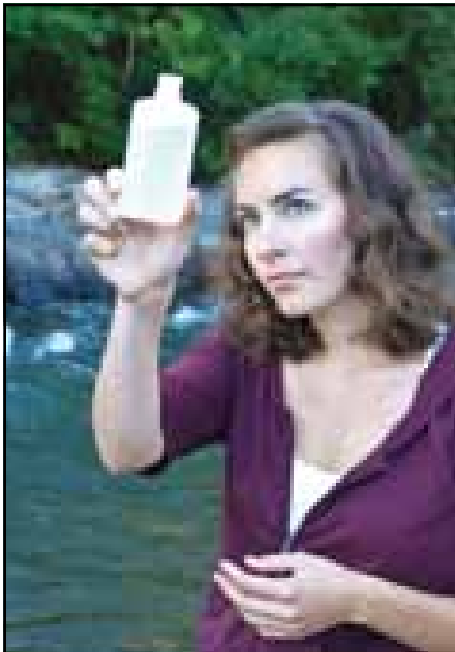
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Save these dates for 2013: Houston—April 19; Oklahoma City—May 3; Golden—to be announced



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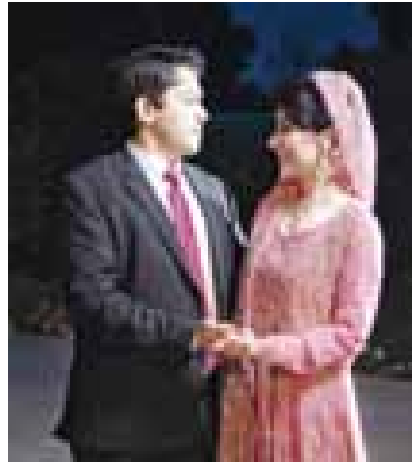
Chris Wenger
Senior Director, Gift Planning
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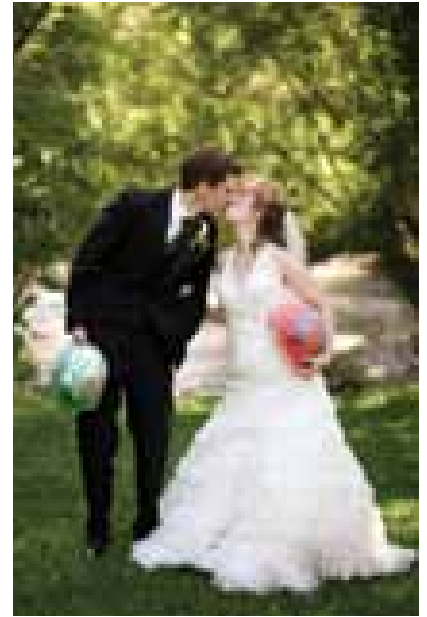
**COLORADO SCHOOL OF MINES
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CLASSNOTES



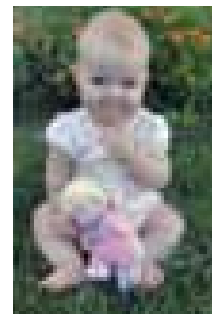
PRETTY IN PINK Sidra Shahid MS '11 and Syed Ali Raza Hussain were married on March 28, 2012, in Islamabad, Pakistan.



SINGING AT THE START Jeffrey Kramer '08 and Rebecca Johnson '09 were married in Boulder, Colo., on July 27, 2012. There were 13 Mines alumni in attendance. Highlights of the ceremony included a raucous rendition of "The Mining Engineer."



WHERE THE BISON ROAM Will Janney '07 married Jamie Hartwell on March 10, 2012, at a buffalo ranch in Texas. Ten Mines alumni attended.



SWEET BABY ROLLS Dawn '00, PhD '09 and Alan Culley welcomed Laura Phyllis into their family on February 17, 2012, joining brother Samuel (4) and sister Hannah (2).



NEW MIDDLE EAST CHAPTER Alumni gathered in Kuwait City on September 26 for dinner at the Hilton Hotel & Resort to launch their newly formed Mines alumni chapter. Ramona Graves PhD '82, head of the Petroleum Engineering Department and dean of the College of Earth Resource Sciences and Engineering, gave the keynote address.

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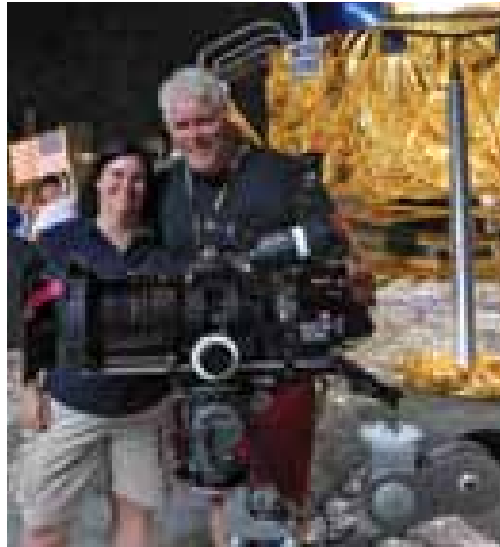


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Real Estate Broker Associate

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as an Athletic Administrator,
Coach and Teacher
dl@easystreetproperties.com

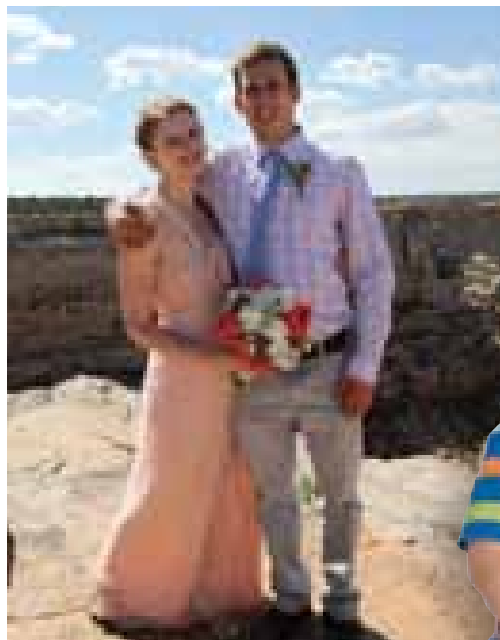
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720-530-2782

CLASSNOTES



WHEN MOVIES BECOME ROCKET

SCIENCE Penny J. Pettigrew '92 has been serving as a technical advisor (and occasional extra) during the filming of the movie *Space Warriors*—an updated version of the 1986 movie, *SpaceCamp*—on location at Space Camp in Huntsville, Ala. Appropriately, it was the 1986 movie that prompted Penny to attend Space Camp, which led her to graduate school and thence to NASA's space program. Look for the movie in theaters in spring 2013.



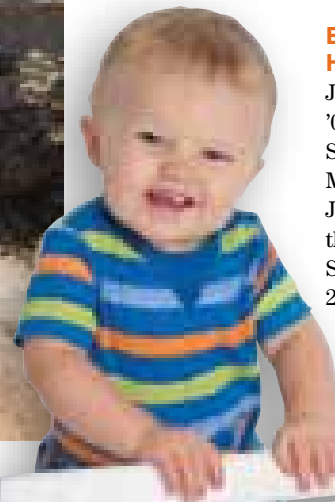
NEW ADVENTURE Dan Park '08 and Jami Morton '08 were married June 16, 2012, at Colorado National Monument in Grand Junction, Colo. David Pilger '08, MS '09, Claire DuPont '08 and Michael Deal '08 were in the wedding party.



DRESSED FOR SUCCESS Shirley '04 and Neil Mac Somerville Jr. announce the January 4, 2012, birth of their first child, William Wyatt.



LOCAL NUPTIALS Michelle LeHota '96 married Adam Toso on March 27, 2011, in Denver, Colo.



BORN HAPPY

Janson Ferrara '09 and Amy Sarr welcomed Matthew Joseph into the world on September 2, 2011.

Thank you for making last year the most successful fundraising year in Mines history, securing \$32.6 million in support for the university!

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COLORADO SCHOOL OF MINES RECENTLY* RECEIVED 13 OUTSTANDING LEADERSHIP GIFTS AND COMMITMENTS:

An **anonymous** donor committed \$7.5 million to kick start the Clear Creek Athletics Complex project at Mines.

Phil A. Bowman '67 made a \$250,000 commitment to a charitable remainder trust to support excellence in mining education at Mines.

A bequest distribution of \$224,000 from the estate of **Genevieve A. Darden** will support the Darden Scholarship Fund, which was established in 1994 in memory of her husband, longtime basketball and baseball coach **James W. Darden**.

Bequest distributions from the estate of **Richard F. Dewey** '43 will provide \$250,000 in unrestricted support for the university.

ExxonMobil gave a \$333,334 gift to support education, training and outreach programs through Mines' Unconventional Natural Gas and Oil Institute.

Ben L. Fryrear '62 made a \$500,000 contribution to establish two Fryrear Developmental Assistant Professorships in the College of Engineering and Computational Sciences.

GE gave a \$333,334 gift to support education, training and outreach programs through Mines' Unconventional Natural Gas and Oil Institute.

Bruce E. Grewcock '76 made a \$5 million commitment to augment the Grewcock Scholarship and to provide comprehensive support for the new Center for Underground Construction & Tunneling.

A \$100,000 leadership grant from **HP** will expand the HP Catalyst Initiative at Mines.

Dean Laudeman '55 made a \$100,000 commitment to the Robert J. Weimer Distinguished Endowed Chair in Sedimentary and Petroleum Geology.

Thomas A. Petrie made a \$250,000 commitment to The Mines Fund, providing valuable flexible resources for the university.

Thomas C. '36 and **Mary Snedeker** established additional charitable gift annuities with a contribution of \$100,000.

Michael R. '83 and **Patricia K.** '83 **Starzer** made a \$5 million commitment to establish a student scholarship fund.

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

Aera Energy LLC committed \$60,000 to the Aera Energy Scholarship Fund.

The ARCS (Achievement Rewards for College Scientists) Foundation contributed \$45,000 toward student scholarships.

ATAC Resources Ltd. contributed \$93,833 in support of a research study in the Department of Geology and Geological Engineering.

Forest J. '03, **MS** '05 and **Olivia O.** '03, **MS** '05 **Bommarito** established an endowed scholarship fund with a commitment of \$25,000.

Cameco Corporation contributed gifts totaling \$42,923 in support of a graduate student project.

Stan and **Judy Dempsey** gave \$25,000 to support Arthur Lakes Library and the Dempsey Endowed Scholarship Fund.

Italian company **Eni** contributed \$32,465 toward hydrates research at Mines.

William W. Fleckenstein '86, **MS** '88, **PhD** '00 committed \$75,000 in support of Marquee Hall.

Hendricks and Associates, Inc. committed \$30,000 to the Robert J. Weimer Distinguished Endowed Chair in Sedimentary and Petroleum Geology.

Patrick M. James '68 gave \$25,000 to the Leslie S. James Memorial Endowed Scholarship Fund and to The Mines Fund.

Stephen E. James '76, **MS** '77 made a \$65,000 gift to endow the John P. Hager Scholarship in Metallurgy.

Marathon Oil Corporation gave gifts totaling \$46,000 to support student scholarships and academic departments.

Ben E. Mares '73 committed \$50,000 to the Clear Creek Athletics Complex.

With a **McLain family** gift of \$25,000, the parents and grandparents of Mines' most-decorated student-athlete in school history established the Michael "Mack" McLain Endowed Scholarship.

Lawrence A. McPeck '62 made a \$50,000 commitment to the Robert J. Weimer Distinguished Endowed Chair in Sedimentary and Petroleum Geology.

Glen J. Mizenko '85 and **Clara I. Putzig Mizenko** '85 committed \$30,000 to Marquee Hall and The Mines Fund.

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

Alexander H. Paul '69, **MS** '75 made a \$25,000 gift toward the Robert J. Weimer Distinguished Endowed Chair in Sedimentary and Petroleum Geology.

Primal Innovation, LLC made a \$28,000 contribution for graduate student support in the Department of Geophysics.

Neal E. Schmale '68 contributed \$63,000 toward the Schmale Family Endowment for the McBride Honors Program and The Mines Fund.

Fred C. Schulte '68 contributed \$25,000 toward the Schulte Endowment for the McBride Honors Program and The Mines Fund.

Michael S. Stoner '94, **PhD** '97 made a \$25,000 contribution to the Dr. Billy J. Mitchell American Driller Scholarship Fund.

Andrew P. Swiger '78 made a \$30,500 contribution to The Mines Fund.

Tenaris made a \$50,000 commitment in support of the Roberto Rocca Scholarship Fund.

J. Don Thorson '55 contributed \$50,000 in support of the annual Leadership Summit.

The Timothy and Bernadette Marquez Foundation gave \$25,000 in support for Mines' Summer Academic Focused Education (SAFE) Program.

A \$25,000 bequest from the estate of **Michele M. Vivona** '86 established the Al Vivona Departmental Support Fund, which will provide resources to the Department of Applied Mathematics and Statistics.

The Williams Foundation made contributions totaling \$39,440 in support of Mines' annual Leadership Summit, a speaker series in the Mechanical Engineering Department, the Multicultural Engineering Program and student groups.

The acknowledgements listed in *Mines* magazine recognize single gifts and commitments of \$25,000 or more. Over the course of the fiscal year ending June 30, 2012, the following donors gave multiple gifts that totaled \$25,000 or more:

Donna S. '97 and **Larry W. Anderson**

Lawrence '49 and **Rose Curtis**

William G. Duey '82

Hugh W. '49 and **Ann Evans**

J. William II '70, **MS** '72 and **Carolyn J. Fishback**

Luanna Goetz

William F. Guenther Jr. '42

Patrick P. McCall '52

Phuriphan Phirakijkusol

John G. Underwood '53*

Milton H. Ward†

Warren '62 and **Ada Wright**

Nicholas B. '01 and **Chantee N. Ziemkowski**

*deceased



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* The CSM Foundation received the gifts and commitments listed here between 5/10/12 and 8/15/12.

IN MEMORIAM

“When you are sorrowful look again in your heart, and you shall see that in truth you are weeping for that which has been your delight.”

—Kahlil Gibran



DONALD "DON" F. ASBRA '55 of Alexandria, Va., died July 1, 2010. Born in 1933 in Denver, Colo., Don graduated from Wheat Ridge High

School and then earned a professional degree in geological engineering from Mines. After graduation, he served as a first lieutenant in the Army. His career took him from the oil fields of Wyoming and North Dakota to the Bureau of Indian Affairs in Gallup, N.M.; he moved to Alexandria in 1966 and retired from BIA in Washington, DC, in 1992. Don is survived by his wife of 58 years, Mary Louise; five children; and seven grandchildren.



RUSSELL BADGETT JR. '40 of Madisonville, Ky., died March 8, 2012. Russell was born in Wabbaseka, Ark., in 1918, and received the Silver Beaver Award

as an Eagle Scout for distinguished service as a council leader. At Mines, he earned a professional degree in mining engineering, and was a member of Blue Key and, later, the President's Council. Russell served as a naval aviator in the South Pacific as a second lieutenant from March 1942 until November 1945.

For more than 50 years, Russell owned and operated a mine in western Kentucky. With his two brothers, he pioneered surface mining with the use of drag lines through Badgett Mine Stripping, and later formed Russell Badgett Jr. Coal Co. and Sextet Mining Corp. He was a member of the American Institute of Mining, Metallurgical, and Petroleum Engineers. In addition to being the owner and chairman of Hancock Bank and Trust, Russell was a 33-year cancer survivor. His wife, Juanita, and infant son, Roy, preceded him in death. He is survived by six children, including Bentley Badgett II '74; 16 grandchildren; and 16 great-grandchildren.



DENVER M. BARB '43 of Lakewood, Colo., died June 22, 2012. Denver was born in Alton, Kan., in 1921 shortly before his family moved to Golden so

that his father, Clark Barb '25, MS '28, could attend Mines. He earned a professional degree in petroleum engineering under his father, a professor at Mines, who was infamous for his petroleum geology field camp known as "Barb's Death March." While at Mines he was a member of the baseball team, Blue Key, and Sigma Gamma Epsilon fraternity; later he became a member of the President's Council. After graduation and a commission of second lieutenant in the U.S. Army Air Corps, he helped design and set up an aircraft maintenance assembly line in Harlingen, Texas, and ultimately traveled in the Northeast inspecting weapons and packaging for long-term weapons storage from his base in Dayton, Ohio.

After World War II, Denver and his wife, Peggy, moved to Limon, Colo., and worked for the auto service and supply business started by Peggy's father. By the mid-1980s, two of his three children had joined the company, and he retired to California with his second wife, Leslie Holland, with whom he traveled the world. He is survived by his son, Anthony '74; daughters Deidra Barb '79 and Denise Newman; and four grandchildren, including alumna Tanya (Barb) Hanford '01, MS '02. Other Mines alumni in his family include brother-in-law Richard Fulton '50 and son-in-law George Newman '78.



WILLIAM H. COOKE '53 of Federal Way, Wash., died October 5, 2011. Born in Denver, Colo., in 1928, William was inducted into the CSM Athletics Hall of

Fame in 1999 for his role on the 1951 football squad. Also a member of the swimming team, he graduated from

Mines with a professional degree in metallurgical and materials engineering. He spent much of his career with Kaiser Aluminum. His large family includes 11 children, 32 grandchildren and 22 great-grandchildren.



FREDERICK "FRED" F. DUESER '49 of Breckenridge, Texas, died February 26, 2012. Fred was born in Ellinwood, Kan., in 1922 and was a Navy pilot in

World War II. After marrying Dorothy Roth in 1945, he earned a professional degree in petroleum engineering from Mines, where he joined the Sigma Phi Epsilon fraternity. Five years after joining Graridge Corporation in 1959, he and five other partners sold the company and started Petroleum Corporation of Texas. In later years, Fred owned numerous companies, including Bates Coal, Hubbard Development, PC Limited, States Inc. and States Limited. A resident of Breckenridge for 53 years, he served on the Breckenridge School Board for 12 years, most of the time as president. He also served on the Parish Council, Building Committee and as Lector of the Sacred Heart Catholic Church. At the time of his death, he was chairman of the board of Breck Operating Corporation and Ibex. Fred is survived by his daughters, Linda Duhon, Cassie Griffith and Denise Cook; son Scott; 11 grandchildren; and several great-grandchildren.



DONALD "DON" W. GENTRY of Bella Vista, Ark., died July 2, 2012. Born in 1943 in St. Louis, Mo., Don had a 25-year career at Mines as former head

of the Mining Engineering Department, assistant to the dean of faculty, and dean of engineering and undergraduate studies. He also served on the McBride Tutorial Committee and was an emeritus professor, retiring in 1998. Don graduated from the University of Illinois,

University of Nevada and University of Arizona, where he received his PhD in mining and finance. A published author, Don was president of the Society of Mining, Metallurgy, and Exploration and the American Institute of Mining, Metallurgical, and Petroleum Engineers. A member of the National Academy of Engineering, Don served on the board of directors for Gryphon Gold, Santa Fe Gold, Newmont Mining and Newmont Gold. In 2003, he moved from Colorado to Bella Vista. He is survived by his wife, Sheila; son Chad MS '99; daughter Tara; and four granddaughters.



VICTOR "VIC" L. HAYES JR. '48 of Charlotte, N.C., died March 22, 2012. He was born in Casper, Wyo., in 1922. Vic attended MIT before transferring

to Mines in 1941, where he was a member of the Alpha Tau Omega fraternity. As a second lieutenant in the 1253rd Engineer Combat Battalion, he helped build a heavy pontoon bridge across the Rhine River at Wesel, Germany, in March 1945. He returned to Mines after the war to complete his professional degree in metallurgical and materials engineering. After graduation, he launched a 37-year career with Phillips Petroleum in Odessa, Texas, traveling extensively as a senior metallurgical engineer to the United Kingdom, Norway, Kuwait, Egypt, Indonesia and Iran. Vic retired from Phillips in 1985. He was a member of the Mines President's Council, a Boy Scout leader, active in Kiwanis, and an ER volunteer at Jane Phillips Hospital. He was preceded in death by his wife, Margaret, and is survived by daughter Amy Baker, sons Scott and Anthony, four grandchildren, and two great-grandchildren.



JERRY P. ILGENFRITZ '61 of Golden, Colo., died May 19, 2012. He was born in Waterloo, Iowa, in 1938 and moved to Wheat Ridge, Colo., in 1951. A member of the Beta Theta Pi fraternity at Mines, he graduated with a professional degree in mining engineering. He went on to earn a master's degree in industrial engineering from Arizona State University in 1966. He then served with

the U.S. Army Corps of Engineers for 25 years, including two tours in Vietnam (1967–1970). He headed up the Mining Engineering Department at Mines from 1980 to 1983. Jerry retired from military service in April 1986 as Colonel U.S. Army Corps of Engineers and moved to Golden, having earned the Legion of Merit, three awards of the Bronze Star, three Meritorious Service Medals, and the Army Commendation Medal. Active in Lions International, he was made a Melvin Jones Fellow—the highest rank awarded to a Lions member. His service to Mines includes membership in the Silver and Blue and his reunion planning committee. Jerry is survived by his wife of 51 years, Elaine; daughters Denise Thrasher, Katherine Brown and Anne Ilgenfritz; five grandchildren; and one great-granddaughter.



ROBERT "BOB" A. JOHNSON MS '56 of Potomac, Md., died October 18, 2011. A native of Youngstown, Ohio, Bob was born in 1929 and received

a bachelor's degree from Ohio State University in 1950. After serving in the Army in the Korean War, he earned a master's degree in geophysics from Mines and, in 1960, graduated from George Washington University Law School. Bob was a patent lawyer for the Patent and Trademark Office from the mid-1950s to the mid-1980s. He took classes at the Corcoran Gallery of Art during his career and enjoyed portrait and landscape painting. He is survived by his sister, Shirley Fuscoe.



LAWRENCE H. KUMAMOTO MS '73, PhD '77 of Carson City, Nev., died October 4, 2011. Shortly after his birth in 1945, his family

moved to San Francisco, Calif., where he spent his formative years. He earned a bachelor's degree in geophysics from the University of California at Berkeley in 1967 and was then drafted into the Army, serving the next two years in the Signal Corps as a meteorological observer. At Mines, Lawrence completed his master's degree and doctorate in geophysics, and then worked for Microgeophysics, D'Apollonia Engineering, and Peabody

Coal, the latter as chief geophysicist. He landed in London with BP, staying with the company for many years until returning to the U.S. to start his own business, Ronin Technical Services, where he remained until retiring in 2007. Lawrence enjoyed travel; favorite destinations included Scotland, Iran, Algeria, Tobago, Venezuela, Indonesia and the north slope of Alaska. He is survived by his sister, Emyko Sakakura.



DONALD "DON" B. LARSON '88, MS '91 of Grand Junction, Colo., died February 6, 2009. Born in Inglewood, Calif., in 1965, Don received

his bachelor's and master's degrees in mechanical engineering from Mines and, in 1991, moved to Wolfurt, Austria, to work for Doppelmayr Seilbahnen as a project engineer, where he enjoyed hiking, mountain biking, skiing and traveling around Europe. After returning to Colorado a year later to work for Poma of America, he joined Tramway Engineering in 1998, and then opened a consulting business, Ropeway Technical Services, in 2003. In 2008, Don received the Robert Lesage Award for contribution and devotion to the ski industry. He played the saxophone and electric bass, and enjoyed hiking and climbing, summiting 17 of Colorado's 14-ers. Don is survived by his wife, Gretchen; daughter Elisabeth; son Tyler; father David; and mother Toni.



LAWRENCE "LARRY" B. LEIGH '42 of Colorado Springs, Colo., died July 3, 2011. Born in Little Rock, Ark., in 1919, Larry spent many

summers vacationing with his family in Colorado. A member of the Sigma Alpha Epsilon fraternity at Mines, he graduated with a professional degree in petroleum engineering from Mines and then served as a fighter pilot in World War II with the 456th Squadron on Iwo Jima. Larry retired from the Colorado State Highway Dept. in Colorado Springs as the utilities engineer for the southern district after 20 years, and spent many subsequent days on the golf course. He was a charter and founding member of the Broadmoor

Community Church and a longtime member and past president of the Cheyenne Mountain School Board. Larry is survived by his wife of 66 years, Helen Jean; sons Jeffery and Bruce; daughter Jane; and five grandchildren.



DORINGTON "DORY" G. LITTLE II '50 of Paradise Valley, Ariz., died September 24, 2010. He was born in Los Angeles, Calif., in 1927 and earned

a professional degree in geology and geological engineering from Mines. In 1957, Dory joined Mobil Oil in Iran, where he was an exploration and survey geologist, senior exploration geologist, and head of the exploration geology department. Other assignments with Mobil took him to Abu Dhabi, Australia, Libya and Indonesia; he was president of Mobil Oil Indonesia from 1971 to 1978, when he became president and general manager of Mobil Oil Canada in Calgary. In 1980, Dory was awarded the Mines Distinguished Achievement Medal. He was a member of the American Association of Petroleum Geologists, the Geological Society of London, and the Canadian Society of Petroleum Geologists. He is survived by his wife, Rosie, and son Oliver.



STEPHEN MASZY '43 of Windermere, Fla., died January 4, 2012. Stephen was born in Harsco, Ill., in 1918. After graduating from Mines with

a professional degree in metallurgical engineering, he worked as an engineer with Martin Marietta Corp. In 1966, he started Triangle Auto Parts, and then opened T & P Automotive Warehouse. He was preceded in death by his wife, Bettie, and is survived by his daughter, Lavina Williams; sons John, Riley and Steve; 10 grandchildren; and 17 great-grandchildren.

HENRY A. MULLEN '70 of Louisville, Ky., died June 11, 2012. Born in Adena, Ohio, in 1943, Henry graduated from Gallia Academy High School in 1961 and served in the U.S. Navy aboard the USS Duval County. He earned a

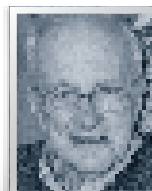
metallurgical engineering degree from Mines and, starting in the 1980s, worked for Chemical Piping Systems and Imrie-Gielow, both in Missouri. Henry was a 24-year member of the Gallipolis Elks Lodge. He is survived by his brother, J. Fran.

RICHARD L. RAYNO '59 of Tilton, N.H., died December 18, 2011. Richard was born in Franklin, N.H., in 1929 and worked as a locomotive machinist for the Alaska Railroad in Anchorage before serving in the U.S. Coast Guard and Army. Following his military service, he received a professional degree in geophysical engineering from Mines. For many years Richard worked as a geophysical engineer for Chevron. He was predeceased by two wives, Jean (Daigneau) Rayno and Jennie (Weglarz) Rayno. He is survived by his wife, Roseamond; daughters Terry Twyman and Pamela Rayno; and son Robert.



GORDON L. ROYCE '60 of Mobile, Ala., died September 28, 2009. A native of Durango, Colo., Gordon was born in 1938. He was in the ROTC at Mines,

where he earned a professional degree in petroleum engineering, and was commissioned as a lieutenant in the Army, seeing active service in Korea. Gordon worked for Northern Illinois Gas in the engineering and underground gas storage departments. He later joined Nicor Drilling and was instrumental in helping the company grow its business in many states. In the early 1990s, he joined Mobile Gas and served as vice president of Bay Gas Storage, where he retired in 2001. Gordon, an avid hunter and fisherman, is survived by his wife, Annett; son Michael; daughter Michelle; step-daughters Lisa Thornhill, Anita Howell and Tina Edmond; and 11 grandchildren.



THOMAS "TOM" S. SCHALK '49 of Wichita Falls, Texas, died February 16, 2012. Born in Fort Collins, Colo., in 1924, his family moved several times

before landing in Tulsa, Okla., in 1937, where Tom attended high school. After

joining the Army Air Corps at Fort Sill, Okla., in 1943, he was sent to study pre-meteorology at the University of New Mexico and later Cal-Tech. Upon graduation, Tom was commissioned as a second lieutenant and assigned to Chanute Field, Ill. After being discharged from the corps in 1946 as a first lieutenant, Tom moved to Casper, Wyo., where he played semi-pro basketball for Western Oil Tool. He also played basketball and baseball at Mines, where he earned a professional degree in petroleum engineering, and was a member of the Alpha Tau Omega fraternity. Tom began his career in the oil business in 1949 working for Sharples Oil in Midland, Texas, where he played basketball for Rotary Engineering. An independent oil producer from 1957 until his retirement in February 2012, he was a registered professional engineer in Texas and New Mexico, and was a member of many professional organizations. He was preceded in death by his wife, Betty June, and son Jim. He is survived by his son, John; daughter Susan; and granddaughter Gigi.



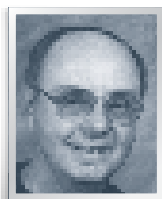
WILLIAM "BILL" R. SMITH '48 of Littleton, Colo., died February 5, 2012. Born in 1924 in Denver, Colo., Bill entered Mines in 1942, but served in the Army

Air Corps from 1944 to 1945, returning in 1946 to complete his professional degree in petroleum engineering. At Mines, he was a member of the Alpha Tau Omega fraternity. Bill served Colorado for 31 years in the Division of Water Resources and the Oil and Gas Conservations Commission, where he retired as director in 1989. In addition to being a member of CSMAA and the President's Council at Mines, he was a member of the Colorado Oil & Gas Association, Independent Petroleum Association of Mountain States (now Western Energy Alliance), and the Society of Petroleum Engineers. He is survived by his wife of 66 years, Joyce; together they had six children, 12 grandchildren and 12 great-grandchildren. Among children and grandchildren, three are alumni: son Brian Smith '85, grandson Erik Smith '03 and granddaughter Jenny Rotramel-Ronhovde '08. (Read a profile on Bill in the fall 2005 issue of *Mines*.)



ROBERT "BOB" H. TRENT PhD '80 of Scottsdale, Ariz., died April 5, 2012. The former Wyoming state senator was born in 1936 in Pittsburg, Kan.

In 1968, after working as a draftsman for a mining company for many years, the 32-year-old husband and father of two enrolled at the University of Utah and completed bachelor's and master's degrees in mining engineering in less than four years. After several years in the industry, Bob completed a doctorate in mineral economics from Mines. He later moved to Kaycee, Wyo., and established New Tech Oil, where he applied his ideas on recovering oil from shallow, low-energy oil fields by means of horizontal drilling from a shaft. In addition to working for a number of mining, oil and chemical companies, Bob taught at several colleges, including Mines, and was dean of the School of Mineral Engineering at the University of Alaska Fairbanks for seven years. He also held several patents related to mining and drilling techniques. In 2011, Bob received the Melville F. Coolbaugh Memorial Award from Mines for his outstanding contributions toward enhancing the reputation of the school. He is survived by his wife of 55 years, Marlene; two daughters; five grandchildren; and two great-grandchildren.



JOHN H. TURNER '57 of Glenwood Springs, Colo., died April 20, 2012. Born in Denver, Colo., in 1935, John earned a professional degree in geological

engineering from Mines, where he was a member of Sigma Phi Epsilon fraternity and ROTC. After working for Magma Copper, John attended Officer Candidate School in Quantico, Va., and served two years in the Army at Ft. Belvoir, Va., and Ft. Hood, Texas, teaching engineering, traveling with the Army Marksmanship Team, and winning numerous awards for marksmanship. During his 30-year career with Mid-Continent Resources in Glenwood Springs, which began in 1960, he was vice president, chief engineer and geologist. He enjoyed traveling, golfing, camping with his grandsons, and, after retirement, playing bridge. He was

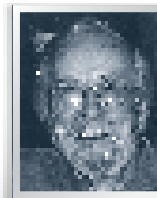
a member of the local Masonic Lodge for more than 50 years, including serving as Worshipful Master. John belonged to CSMAA and the American Institute of Mining Engineers, among several other professional organizations. He gave many years of volunteer service as a tax preparer with the Retired Senior Volunteer Program. John is survived by his wife of 55 years, Roberta; daughters Jan Marusin and Susan Hunt; and four grandchildren.



BRUCE H. WEST '93 of Eagle, Idaho, died April 20, 2012. Born in San Diego, Calif., in 1969, Bruce joined Kappa Sigma fraternity, the ski team and

rugby club at Mines. He graduated with a degree in petroleum engineering and went on to work for Apache in Denver as a petroleum engineer. He moved to Houston in 1995 to continue his work in oil and gas; in 2000, he earned an MBA from the University of Houston. In 2002, Bruce moved with his family to Eagle to work for Petroglyph Energy, where he was vice president of engineering and production. In addition to his career, Bruce loved camping with his family, being active in his church, supporting his children in school activities, fly-fishing, sailing, dirt biking, mountain biking, skiing, rugby and tennis. He is the grandson

of alumni M. Jordan Nathason '36 and Randolph M. West Jr. '37, and was a member of the Society of Petroleum Engineers. Bruce is survived by his wife, Cari; children Sydney and Mason; parents Robert and Alasya; and sister Krista (married to Joe Welch '93, MS '01).



EDGAR "ED" I. WINGER '56 of Hill City, S.D., died November 27, 2011. Born in Ridgeway, Ont., Canada, in 1926, Ed received a scholarship to attend Ontario

College of Arts in Toronto. He served in the U.S. Air Force in information and intelligence before graduating from Mines with a professional degree in geological engineering. Ed worked for International Petrol in Talara, Peru, and then moved to Belem, Para, Brazil, where he worked for Petrobras teaching Brazilian geologists well-site geology. When he returned to the U.S. in 1966, Ed was employed by the North Dakota Geological Survey, the Soil Conservation Service, U.S. Forest Service, and U.S. Geological Survey. He retired in 1981 to Hill City, S.D., where he enjoyed listening to classical music, painting, gardening and stained glass. Ed was predeceased by his son, Philip. He is survived by his wife, Janice, and son Michael.

—Compiled and edited by Amie Chitwood and Nancy Webb

ALSO REMEMBERED

EMMETT B. ASMUS '40.....	June 15, 2009
PETER J. BAER '62.....	November 7, 2002
WILLIAM H. BAUER '59.....	December 2, 2009
BERNARD F. BURFORD '53.....	September 24, 2008
J. RANDALL BURKE '58.....	November 3, 2008
JOSE E. DEL SOLAR '62.....	June 6, 2008
RICHARD J. DOWNEY '44.....	January 23, 2010
JOHN B. FERNSTROM '53.....	March 25, 1991
WILLIAM N. FINK III '57.....	December 31, 2008
DONALD D. KRAFT '58.....	June 17, 1997
HARRY M. LOSEE JR. '57.....	December 19, 2005
RICHARD C. MOCKBEE '58.....	March 18, 2009
ANTONIO NOGALES '53.....	July 15, 1992
DALE R. PORTINGA '58.....	April 29, 2008
GORDON L. POSTLEWAIT '58.....	October 26, 2001
EUGENE C. ROYER '40.....	March 14, 1990
KARY L. SHAFER '84.....	July 13, 2010
RICHARD O. SKANSE '53.....	December 18, 2010
RICHARD J. SULLIVAN '40.....	August 14, 2009
ROBERT C. WHITCOMB '53.....	November 5, 2002

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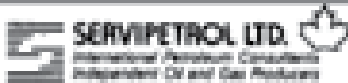
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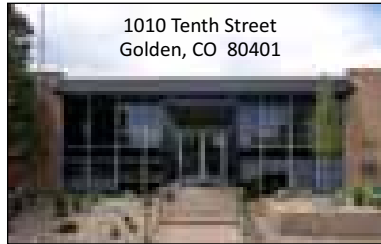
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MINER'S PIC



NO EASY RIDER

For the second year, Judge rode a 1979 Suzuki GS1000 in the alumni association's annual Bike Bike Que event in September, completing a 96-mile loop along the Peak to Peak Highway proudly perched on the gas tank. He was accompanied by Zachary Zembower, a senior studying engineering physics, and Zach's girlfriend, Brandie Harris. Upon return to the Coolbaugh House, beer, barbecue and complimentary massages were on offer for bicyclists—who rode 25 miles out to Standley Lake Park and back—and motorcyclists. Catch more snapshots of the Bike Bike Que and Judge at [Facebook.com/minesalumni](https://www.facebook.com/minesalumni); click on Photos.

This picture was taken by Chelsea Panos, a sophomore majoring in engineering physics. See more of her work in High Grade 2012, or flip through this issue. Want us to feature your photography? Anyone may submit. Whether taken on campus or off, we're simply looking for photography that will appeal to the Mines community. Send yours to magazine@mines.edu.



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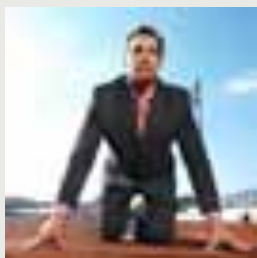
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