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Spring 2015 Volume 105 Number 1

# Mines

Colorado School of Mines Magazine



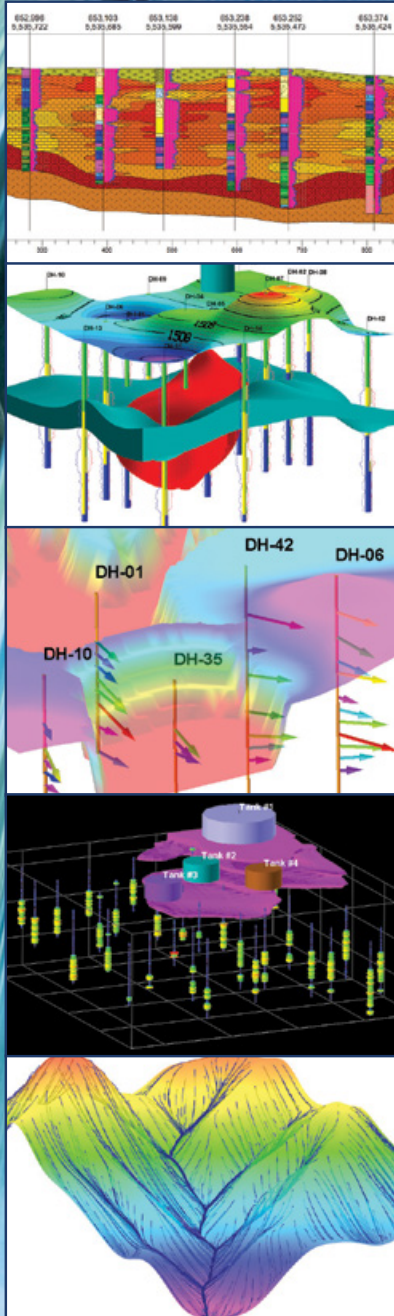
# MINES TO MARS

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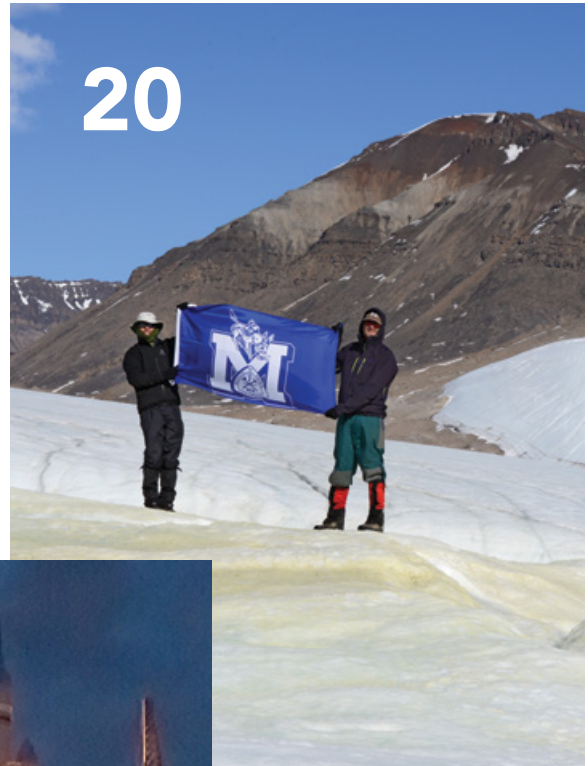
## FEATURES

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Paul Anderson '85 and Heather McKay '07 are among 38 Mines alumni working on the Orion mission at Lockheed Martin. Drawing on the grit and tenacity they gained from their experience at Mines, the engineers are helping to usher in a new era of space exploration that could make humans a multi-planet species.

### 20 Looking Deep for Far-Out Life

Mines professor John Spear is part of a NASA-funded research team examining subsurface life forms that don't need the Sun, which may hold the key to understanding the possibility of life elsewhere in the universe.



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**Cover image:** An artist's concept of the Space Launch Vehicle that carried the Orion spacecraft to orbit on its test flight on December 5, 2014. Courtesy of NASA.


## WEB EXTRAS | MULTIMEDIA


[minesmagazine.com](http://minesmagazine.com)

 **Faculty Member Profile** Seven things you might find in Professor John Spear's office

 **Student Profile** Sophomore mechanical engineering student breaks barriers as pro female kart racer

 **In Brief** Mines and NREL awarded \$1.5M by U.S. Department of Energy to develop next generation solar PV technologies | Research examines intrusion of toxic vapors into indoor air | Humanitarian engineering class explores moving African village

 **Mines Fight Song** Show your Mines pride and download the fight song as your ringtone: [zedge.net/ringtone/636063](http://zedge.net/ringtone/636063)

 **#Orediggers Everywhere** We are excited to see where your studies and travels take you. A monthly prize will be awarded to one alumnus/alumna, student, faculty, or staff who submits an "Orediggers Everywhere" photo. For details or to see examples, check out our "Orediggers Everywhere" photo album at [facebook.com/minesalumni](http://facebook.com/minesalumni).

Icons indicate additional online content



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Mines donors raised \$500,000 for The Mines Fund! Contributions were allocated as follows:







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## A Note from the New CSMAA President

It's been three and a half decades since, as we all say, "I got out." With the passage of time, I have learned to appreciate numerous things about the Colorado School of Mines. First, as my son James (MS Hydro '13) told me about three weeks after starting graduate school at Mines: "Dad, you were right, this school is different." He told me this shortly after a less-than-stellar performance on his first set of exams.

Even John Coors, when he recently announced CoorsTek's gift of \$26.9 million to Mines, began his speech by proudly sharing that he received a zero on his first chemistry quiz. These experiences—and there were a lot of them—are part of the filaments that join us together. It is something we are all proud of, even if it may have caused us to seek therapy at some point.

Our school has changed in many ways, as have the demographics of our alumni. Still, as a whole, Mines students have continued to stand out year after year. I know this to be true, for I have recruited throughout my career at Mines and many of the other top tier engineering schools, mentored interns, and trained new graduates. I encourage all of you to see this firsthand by coming back to campus and being part of your local alumni sections.

Students all seem to have a certain mentor that makes a difference to them at Mines.

For my son, it was Professor Paul Santi (Department of Geology and Geologic Engineering). For me, years ago, it was Marv Kay—yes, the football coach and former mayor of Golden who is still around campus.

Overall, the involvement of our students in non-academic activities is also unique; they participate in more than 180 different activities and organizations. Mines students also want to make a difference in the world, evidenced by the fact that humanitarian engineering is one of the most popular minors on campus. The music department is also a well-kept secret. Did you know they have performed at the Vatican?

Still, sometimes I forget about all the good memories from the five years I spent on campus. But last weekend, fate stepped in to correct that when I was in Houston for a Discover Mines event. Louisa Duley, assistant director of admissions at Mines, asked me to meet with her and a prospective student named Grace. Grace's mother, Jennifer Merkel, instantly recognized me as one of her husband's (Ernie Merkel '81) fraternity brothers. For the next two hours, Grace told me many stories about Ernie and other Mines families they had stayed in contact with over the years. We laughed remembering the good times. Then as Grace explained her passion, to follow her father's path to Mines, we talked about the hard work and how it changes and defines who you are, and tears came to our eyes. Ernie died 14 years ago of cancer, but the difference that Mines made in him lives on in his daughter.

John F. Kennedy said, "God's work must be our own." Likewise, the work of our school must belong to all of us. I look forward to the honor of serving you as president of the Alumni Association, because Mines and each of you are part of who I am.

Sincerely,  
**Ray Priestley '79**  
President, Board of Directors  
CSM Alumni Association



SHAPING PUBLIC POLICY

## Mines Launches Earth Resources Institute



Colorado School of Mines has established the Earth Resources Institute (ERI), which will work to educate and inform policymakers and other stakeholders about pressing issues in the critical areas of earth, energy, and the environment. Through research and policy analysis, ERI will foster collaborative partnerships with established research institutions, universities, and government agencies around the world.

“The vital mission of ERI at Mines is to inform and shape sound public policy with solutions-driven research,



education, and outreach,” said Mines President Bill Scoggins. “A policy institute such as this is a natural fit with Mines’ specialized expertise, and we have the unique qualifications required to become a prominent resource for those engaged in public policy discourse. Since our founding in 1874, Mines has been dedicated to serving industry and society, and with this institute we are marshaling

our expertise to help decision makers address some of the highest-stakes challenges shaping our future.”

ERI will be housed within the Division of Economics and Business and will further establish Mines as a focal point for innovative and influential quantitative analysis. “The ERI initiative provides Mines an institutional base from which to leverage a rich set of faculty resources across campus. It puts us on the map in terms of global public policy issues and analysis in our focus areas,” said Michael R. Walls, interim director of



ERI. “Mines is already known as one of the nation’s top engineering and applied science universities, and ERI will open a wealth of opportunities to further extend our reach.”

Research at ERI will promote rigorous quantitative analysis based on sound economic and scientific principles. Study topics will include rare earths and critical materials, climate and carbon policy, pollution regulation, global trade and the environment, minerals policy, and energy security.

“As the recent U.S. action on a climate pact with China illustrates, this is a policy domain that is entering a critical stage of development. Now is the time when social science can make a big difference in informing the debate. It’s rare to have such a concentration of expertise on energy and environmental economics and policy in one academic institution, and this positions Mines really well to serve that need,” said Associate Professor Jared Carbone.

Initial activities and initiatives to be pursued at ERI include a distinguished lecture series, the development of a topics-based annual conference, a visiting scholars program, and collaborative research initiatives both within the university and with external research partners.

Learn more about the Earth Resources Institute: Policy Analysis for Earth, Energy and Environment at [eri.mines.edu](http://eri.mines.edu).

—Karen Gilbert



Courtesy of Ning Wu

### **MINES PROFESSOR RECEIVES NSF CAREER AWARD**

Ning Wu, Colorado School of Mines Department of Chemical and Biological Engineering assistant professor, received a 2015 National Science Foundation (NSF) CAREER Award for his research “In- and Out-of-Equilibrium Behavior of Colloidal Clusters with Broken Symmetries.” The study’s results will provide fundamental knowledge that scientists and engineers can use to develop materials and devices, such as new sensors or coatings with controlled optical properties.

The project team will also develop a summer research program in colloidal science targeted to high school students in the Denver area, particularly to students from underrepresented groups. A multi-disciplinary course titled “Engineering of Soft Materials” will engage undergraduate students in colloidal science and train them for careers in the materials industry.

The NSF CAREER award is the most prestigious award in support of junior faculty who exemplify the role of teacher-scholars through outstanding research, excellent education, and the integration of education and research within the context of the mission of their organizations.



Thomas Cooper

PRESIDENT'S CORNER

## New Beginnings in Fall 2015

You may notice that something's missing. Usually at this time of year, we're encouraging you to register for Alumni Weekend, which has been held in the spring for the last several years. Instead, we're asking you to save the date: Sept. 30–Oct. 3, 2015.

Beginning this year, Alumni Weekend will be held in early fall

and will become Homecoming Weekend. This move to gather each fall allows us to enjoy the beautiful (and fairly predictable!) Colorado weather, spend time with current Mines students at a time when they're not prepping for finals, and root for Mines varsity sports in the new Clear Creek Athletics Complex (CCAC). It also allows legacy families a chance to visit earlier in the school year.

We have some exciting new events planned this year, including a campus lecture with astrophysicist Dr. Neil deGrasse Tyson, a

Welcome Back pep rally on Maple Plaza, and a special half-time event during the Homecoming football game at the new Marv Kay Stadium at CCAC. And, of course, there will be plenty of opportunity for you to reconnect with classmates at reunion dinners and campus events.

There's also another reason to come back to campus this fall—to meet the 17th Mines president. Last fall I announced my intention to retire in 2015, and the Mines Board of Trustees appointed a search committee representing alumni, faculty, staff, and students to work with a national consultant to recruit my successor. Efforts are well underway, and you can follow the search progress at [mines.edu/PresidentSearch](http://mines.edu/PresidentSearch).

So, come back to Golden this fall to honor the unique Mines experience, talk with our outstanding faculty, connect across generations of Orediggers, and most importantly, to celebrate our shared history and the exciting future that we can create together.

—M.W. Scoggins

INVESTING IN EDUCATION

## \$1.25 Million Gift from Anadarko Petroleum Corporation

Anadarko Petroleum Corporation has made a \$1.25 million commitment to Colorado School of Mines to support the departments of petroleum engineering, geology and geological engineering, and geophysics. A reception to formally announce this gift took place on the Mines campus on Nov. 11, 2014.

"We recognize the importance of investing in high-quality education for our youth, which is essential for our industry and foundational for a sustainable future," said Brad Holly, senior vice president of Anadarko's Rockies Operations. "Anadarko and our Colorado employees, including more than 90 Mines graduates, are honored to be recognized for the ongoing commitment to Colorado School of Mines."

Anadarko's investment will fund undergraduate scholarships, graduate fellowships, student travel and fieldwork, faculty development and teaching support, as well as departmental needs and initiatives. With



George Rosales

this commitment, the company is also supporting two lecture series at Mines.

"Mines is proud of our relationships with the petroleum industry, and we are especially grateful for our ongoing partnership with Anadarko," said Mines President Bill Scoggins. "This new commitment will further the university's capabilities in areas that are critical to the energy industry, and we couldn't

be more grateful for the company's continued support."

Anadarko Petroleum Corporation is among the world's largest independent oil and natural gas exploration and production companies, with 2.79 billion barrels of oil equivalent (BBOE) of proved reserves at year-end 2013.

—Kathleen Morton



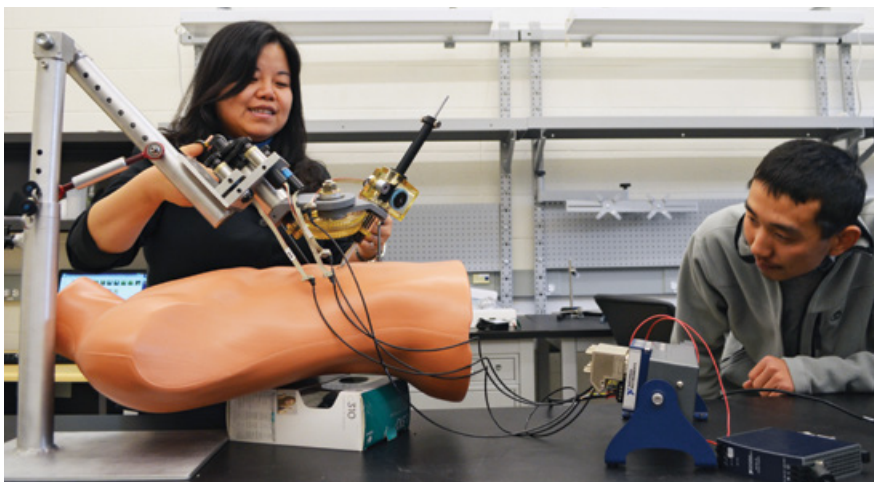
## MEDICAL RESEARCH

# Eye Tracking System May Aid Robotic Surgeries

Colorado School of Mines Mechanical Engineering assistant professor Xiaoli Zhang and graduate student Songpo Li have developed a robotic laparoscope system that can help surgeons better perform laparoscopic surgery. Laparoscopy is an operation performed in the abdomen or pelvis through small incisions with a camera. Laparoscopic instruments (typically 0.5-1 centimeters in diameter) are inserted through small incisions and then operated inside a patient's body with a laparoscope that allows the surgeon to see the surgical field on a monitor.

Unlike open surgery, laparoscopic procedures have been known to reduce scarring, lessen blood loss, shorten recovery times, and decrease post-operative pain. However, due to limitations related to holding and positioning the laparoscope, surgeons struggle with physiologic tremors, fatigue, and the fulcrum effect. Zhang and Li's attention-aware robotic laparoscope aims to eliminate some of these physical and mental burdens. "The robot arm holds the camera so the surgeon doesn't have to," said Zhang. "Wherever you look, the camera will autonomously follow your viewing attention. It frees the surgeon from laparoscope intervention so the surgeon can focus on instrument manipulation only."

The system tracks the surgeon's viewing attention by analyzing gaze data. When the surgeon's eyes stop on a new fixation area, the robot adjusts the laparoscope to show a different field of view that focuses on the new area of interest. To validate the effectiveness of the procedure, the team tested six participants on visualization tasks. Participants reported "they could naturally



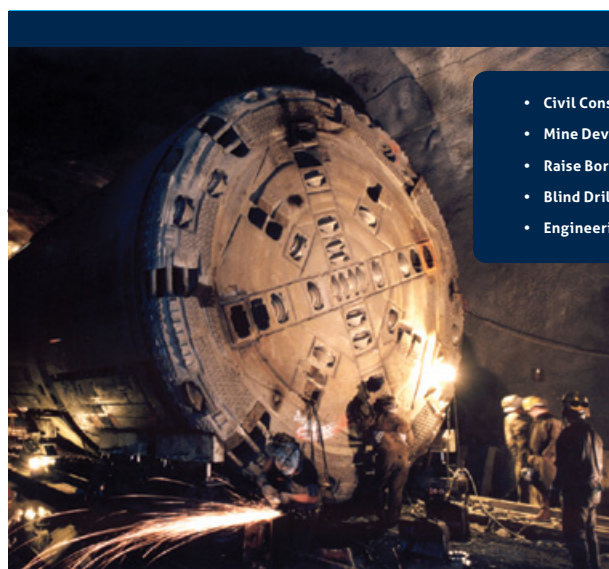
Courtesy of Xiaoli Zhang

interact with the field of view without feeling the existence of the robotic laparoscope."

In addition to healthcare applications, the technology could be used for the disabled and the elderly, who may have difficulty with upper-limb movements, according to Zhang and Li. "Using this system, the surgeon can perform the operation solo, which has great practicability in situations like the battlefield and others with limited human resources," said Li.

In September 2014, Li received the Colorado Innovation S.T.A.R.S. challenge award for "Best Technical Achievement" at the college level during the JeffCo Innovation Faire. Zhang and Li are now working with clinical researchers and industry partners to commercialize their attention-aware robotic laparoscope.

—Kathleen Morton



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## SPORTS

## Orediggers Make Impressive Showing in Fall 2014

During a two-week span last November, the Colorado School of Mines athletics program rode a wave of euphoria that helped define an entire season. The Orediggers came away with either outright claims to or shares of the Rocky Mountain Athletic Conference (RMAC) regular-season and/or tournament championships in four sports. Mines participated in the NCAA Division II postseason in five out of six sports, including the first-ever D-II Final Four appearance, and is currently ranked third in the D-II Learfield Sports Directors' Cup standings. Here is a glance back at a fall season that ranked near the top of the best ever for the Orediggers:



Bryan Desch

### WOMEN'S SOCCER

After progressing to the D-II quarterfinals in three of the previous four seasons, the Orediggers cleared another hurdle by advancing to the national semifinals for the first time. Mines fell to Rollins College 1-0 in December, but not before securing the RMAC regular-season and conference tournament titles, followed by three victories in the D-II tournament. Senior Nicho Cusack and juniors Jayln Yates and Rachael Turner were honored as All-Americans. Yates was chosen the 2014 Daktronics South Central Region Player of the Year after leading the nation in goals against average and save percentage.

### MEN'S SOCCER

In a year that was supposed to be about rebuilding—11 true freshmen were on the roster—the Mines men won the conference tournament title for the third time in five seasons.

The team earned the No. 2 seed in the RMAC Tournament, and a victory over Regis in the semifinals was followed by a shoot-out triumph over University of Colorado-Colorado Springs. The program received another nod when former All-American Tesho Akindele was selected the Major League Soccer (MLS) 2014 AT&T Rookie of the Year in late November. Akindele, the Orediggers' all-time leading scorer, finished his first season in MLS with seven goals and three assists.

### FOOTBALL

For only the third time in the program's long history, the Mines football squad earned a D-II playoff berth after sharing the RMAC title with CSU-Pueblo. The Orediggers finished 10-1 in the regular season, with the only loss coming by eight points to eventual national champion CSU-Pueblo. Kole Kadavy and Cole Spurgeon were All-Americans, with Kadavy setting single-season records for total tackles (132) and solo tackles (79).

Longtime coach Bob Stitt, the program's all-time leader in victories, resigned at the end of the season to accept the head coach position at the University of Montana. Former New Mexico State offensive coordinator/quarterback coach Gregg Brandon was named the new coach in late December, becoming only the sixth coach to lead the program since 1937 (see page 12 in this issue).

### CROSS COUNTRY

Despite battling a course that was besieged by rain and mud, Mines came away with a fourth-place finish and two All-Americans in men's cross country on December 6. Senior Chloe Gustafson led the women to 10th place overall and captured the second All-American honor since 2009 with a 13th-place finish. The men's team finished second in the conference and regional meets, while the women took third at regionals. Both the men and women qualified for nationals for the second time in three years. Chris Siemers was named the RMAC Coach of the Year, the first Oredigger to earn that honor since 1991.

### VOLLEYBALL

The 2014 season included a sixth consecutive appearance in the D-II national championships. The Orediggers earned a share of the RMAC title, along with Colorado Mesa University, the third regular-season crown in a row for the program. Mines was ranked as high as No. 4 in the nation, won 25 games, and had three All-Americans: Danielle Johnson-Hazlewood, Alanna Winfield, and Megan Peterson.

—Brian Miller



For more on Mines athletics, visit [csmorediggers.com](http://csmorediggers.com).



Courtesy of Ulteig

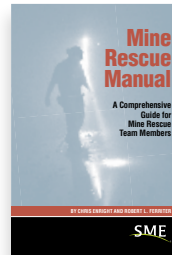


**MINES ALUMNUS TRAINING FOR OLYMPIC GOLD** Mines alumnus Mark Husted '09, MS '10 has his sights set on Olympic gold. The nationally ranked runner spent last summer (2014) competing and training with world-class athletes in Europe to better his chance of qualifying for the 2016 Summer Olympics. Husted said his competitions in Europe drove him to train harder. "I had races with the thrill of placing on the podium and other races where I learned firsthand what it's going to take to make it to the next level." Just one day after he returned home to Colorado, he won the Warrior Dash in Copper Mountain

by more than two minutes. Last spring, he placed third in the Queen Street Mile in New Zealand, known as the fastest mile race in the world. A substation design engineer at Ulteig, Husted is training while pursuing his PhD in operations management at Mines. In January, he set a record as the fastest person to ever run on the Mines track.

## BOOKS

### Just Published



#### Mines Experts Author *Mine Rescue Manual*

Robert Ferriter, Colorado School of Mines senior mine safety specialist, and Mines alumnus Chris Enright '14 authored and compiled *Mine Rescue Manual: A Comprehensive Guide for Mine Rescue Team Members*, recently published by the Society for Mining, Metallurgy & Exploration (SME). The handbook is designed to help mine operators successfully address emergency situations and maximize the protection of human life while minimizing rescue, recovery, and corporate reputational costs.

"There are other materials on mine rescue available, but it is scattered among training centers, universities, and government agencies," said David L. Kanagy, SME executive director. "The authors have brought together the best available information in the industry and have coalesced the material into one concise reference manual."

Ferriter provided leadership for the startup of the Mine Safety and Health Program at Mines. He maintains a key advocacy role in miner safety and health, especially in first responder and rescue team training. Enright is a training captain for the Mine Rescue Team at Mines, an emergency medical technician, and primary author and compiler of the manual.

# ENHANCING

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## SPORTS

## Gregg Brandon Named New Football Coach

Former New Mexico State University (NMSU) offensive coordinator/quarterback coach Gregg Brandon has been named new head coach of Mines' 126-year old football program, the university's athletic director David Hansburg announced in late December. Brandon is only the sixth head coach to walk the sidelines since 1937.

"Gregg Brandon brings an unbelievable amount of experience to Colorado School of Mines. His energy and enthusiasm will be a great asset to our football program as we move into a new era for the Oregidders," said Hansburg.

Brandon, who recently completed his second season coaching the Aggies at NMSU, brings more than 30 years of experience to Mines, including stints at seven NCAA Division I institutions. In his first season with the Aggies, he helped NMSU to the No. 55 national ranking in passing yards. Quarterback Andrew McDonald led the Aggies with 2,497 yards and 15 touchdowns. Brandon also guided wide receiver Austin Franklin and offensive tackles Andy Cunningham and Davonte Wallace to All-Independent Football Team honors.

From 2003-08, Brandon served as head coach at Bowling Green State University (BGSU), compiling a record of 44-30 and guiding the Falcons to three bowl appearances and four winning seasons. Originally hired as the assistant head coach and offensive coordinator in 2001, Brandon led BGSU teams to a bevy of notable non-conference wins: at Purdue (27-26 in 2003), at Minnesota (32-31 in 2007), and at Pittsburgh (27-17 in 2008). He coached 33 All-MAC selections and 2004 MAC Player of the Year, Omar Jacobs.



From 1987-90, Brandon was the wide receivers coach at University of Wyoming (UW) under head coach, Paul Roach. During his four-year tenure, the Pokes went 35-15 and won back-to-back Western Athletic Conference championships in 1987 and 1988, twice finishing conference play undefeated. Wyoming appeared in the 1987 and 1988 Holiday Bowls, as well as in the Copper Bowl in 1990.

Following his time at UW, Brandon held assistant positions at Utah State University (1991), Northwestern University (1992-98), University of Colorado (1999-2000), and BGSU (2001-02). In 2009, he served as offensive coordinator at Virginia State University, and in 2010 he was on the coaching staff of the Las Vegas Locomotives of the United Football League. He has helped lead nine teams to bowl appearances during his collegiate coaching career, including an appearance in the Rose Bowl with Northwestern at the conclusion of the 1995 season.

A native of Colorado Springs, Brandon played football at Mesa State in 1974 before transferring to University of Northern Colorado (UNC), where he played his final three seasons as a defensive back and wide receiver. He graduated from UNC in 1978 with a bachelor's degree in education.

"I am excited to become the head football coach at Colorado School of Mines," said Brandon. "It is a great opportunity to work with outstanding young men who excel in the classroom and win on the field. The opening of the Korell Athletics Center and Marv Kay Stadium for the 2015 season also make this a uniquely attractive place to coach, and it shows how committed the school is to athletics and student life in general."

—Bryan Desch



### FACULTY NEWS

#### BERRY NAMED STATE GEOLOGIST AND COLORADO GEOLOGICAL SURVEY DIRECTOR

Karen Berry has been appointed Colorado State Geologist and director of the Colorado Geological Survey (CGS). Berry has worked for CGS since 1999, where she held positions including engineering geologist, land use program manager, deputy director, and interim director. Berry earned her bachelor's degree in geological engineering from Mines in 1982. CGS joined Colorado School of Mines in 2013 after the state of Colorado transferred the agency to the university. "Karen's experience and leadership were instrumental in ensuring the successful transition of the Colorado Geological Survey to Mines," said Mines President Bill Scoggins. "I am confident that with Karen at the helm, CGS will continue to achieve even greater levels of excellence."





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# FROM MINES TO

# MARS

## Alumni Engineers Help Send Orion to Deep Space

By Lisa Marshall

At 7:05 a.m. on Dec. 5, 2014, Mines alumnus Paul Anderson '85 stood on the causeway at Kennedy Space Center in Florida, looked out across the water to the launch site, and watched five years of his work go up in flames.

The ground shook beneath him. Then came the deafening whoosh, as NASA's Orion spacecraft rode a column of orange flame and grey smoke into the sky for a minute before disappearing. Anderson, whose face was sheet white that morning, would have to wait another 4 hours and 24 minutes before the capsule would splash down near the California coast, having just traveled farther from Earth than any spacecraft designed to carry astronauts since 1972. "It was nerve-wracking," says Anderson, the Lockheed Martin director of avionics for the Orion program. "You put years of your life into something and it's all determined in four and a half hours. It was going to either be a very good day or a very bad day."

It turned out to be a very good day. When Orion finally splashed down, 52-year-old Anderson and dozens of other Mines-grads-turned-Lockheed employees heaved a sigh of relief and celebrated what, for many, was a lifelong dream realized. But their rest would be short-lived. Within days, they were back to work on the next goal: sending four astronauts to an asteroid in 2021 and, ultimately, sending many astronauts to Mars in Orion, ushering in a new era of deep space exploration that could someday make humans a multi-planet species.





The Orion spacecraft sits atop a Delta IV Heavy launch vehicle at Cape Canaveral, awaiting the Dec. 5, 2014, test launch.

NASA



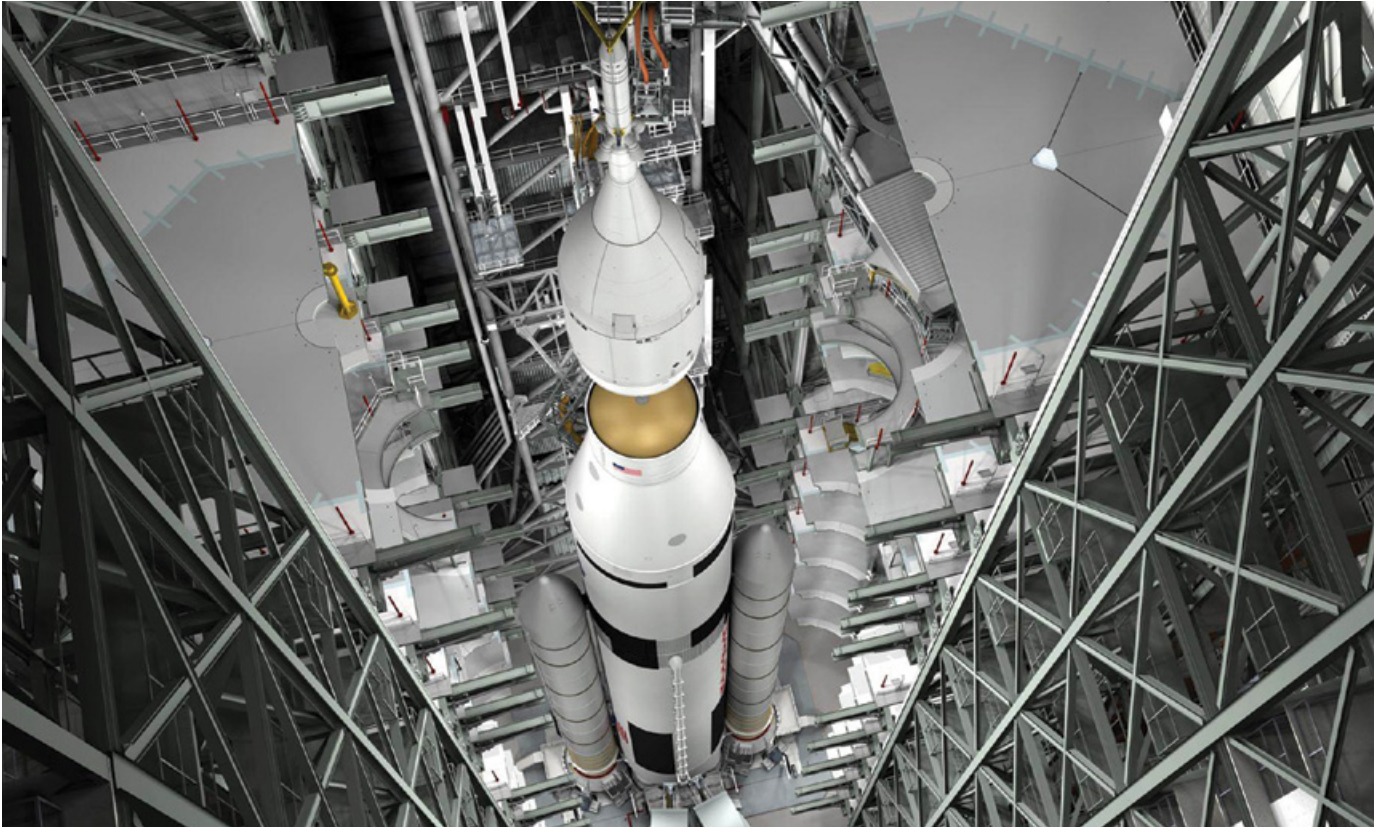
Casey O'Hayre and Heather McKay in front of the Delta IV Heavy and Orion EFT-1 spacecraft the day before launch at Kennedy Space Center.

Lockheed Martin

“One day, an astronaut will leave the first footprints on the red dust of Mars, and we will look back and say it all started on December 5 with this test,” says Lockheed propulsion engineer Heather McKay '07, who couldn't help but tear up a little on the causeway that day. “To be part of that historic event was pretty moving.”

McKay and Anderson are among 38 Mines graduates involved in the Orion project at Lockheed, and among 57 alumni working on civil space projects for the company, making Mines one of the best-represented schools in the country when it comes to landing a spot on Lockheed's aerospace team. That's not surprising to Anderson, who credits Mines' high expectations and broad-based curriculum with prepping him for his 30-year career in the field. In fact, more than 10 percent of Mines graduates go into aerospace, and that number is expected to grow thanks to several new courses, the ability for students to declare aerospace as an Area of Special Interest, and a thriving Space Society and Astronomy Club.

“Aerospace recruiters are looking for a wide variety of engineering and science skills,” says Angel Abbud-Madrid, PhD, director of the Center for Space Resources at Mines. “You need mechanical skills to design components, electrical skills for control systems, and knowledge of geology and geophysics for when these systems go to asteroids and Mars. That is the beauty of Mines—you get all those fundamentals here.”



NASA

*This artist's rendering shows the Orion spacecraft ready for launch atop the Space Launch Systems Heavy Lift Rocket at Kennedy Space Center.*

#### **WHEN I GROW UP, I WANT TO BE AN ASTRONAUT**

McKay decided on a career in space exploration in the fifth grade after accompanying her mom to Take Your Child to Work Day at Lockheed's Littleton facility. There, she met Bruce McCandless, a NASA astronaut who'd been on two space shuttle missions and had taken the first-ever untethered free flight in space. McKay was spellbound, and has been ever since.

"We are just beginning to learn about how to live and work beyond our planet," says McKay, 30, who has a photo from that day with McCandless on her office wall. "What's out there? Are we alone in the universe, or is it teeming with extraterrestrial life? Just thinking about this, even as a kid, made me know this was the field for me."

McKay's academic record and stature (she's six feet tall) caught the eye of Mines recruiters. She graduated with a BS in mechanical engineering in 2006, leaving a legacy as one of the top female scorers ever on the basketball team. In 2007, after earning her MS in systems engineering, she landed a job working on Lockheed Martin's new contract with NASA: building a vessel called Orion capable of exploring deep space.

Casey O'Hayre '09, like McKay, grew up near Lockheed, landed at Mines on a basketball scholarship, and pegged aerospace as his career of choice early on. "I have always loved

"I have always loved the idea that we are advancing human civilization, moving us closer to being a multi-planetary species."

—Casey O'Hayre

the idea that we are advancing human civilization, moving us closer to being a multi-planetary species," says O'Hayre, a systems engineer in charge of avionics.

Anderson's backstory was notably different than that of McKay or O'Hayre. "A lot of people in this business dreamed of being an astronaut since they were little kids, but I dreamed of becoming a basketball coach," he says. At 6-foot-3, and as the son of a Division I basketball coach, Anderson always assumed





Heather McKay and NASA astronaut Rex Walheim prepare to announce the winner of NASA's Exploration Design Challenge (EDC). McKay is holding a scale model of the Orion Launch Abort System, and behind them is a mockup of the Orion Crew Module.



Lockheed Martin

## COLORADO AEROSPACE BY THE NUMBERS

Colorado is ranked No. 1 in the United States for per-capita aerospace workers. Here's why:

**162,680**

space-related jobs

**\$3.2 billion**

in annual payroll

**400**

companies and suppliers

**3rd largest**

aerospace economy

**17 percent**

space employment growth in the past decade

Source: Colorado Space Coalition

he'd follow in his father's footsteps. Although he came to Mines to play small forward for the Orediggers, he soon excelled on and off the court—studying on the bus to and from distant games. Shortly before he graduated with a degree in electrical engineering, he attended a job fair and met a recruiter for Martin Marietta (now Lockheed). "I sort of stumbled into this, and I'm really glad I did," he says.

All three alumni say juggling 18-credit-hour schedules with two-hour daily basketball practices helped prepare them for the grueling, travel-heavy schedules of their current jobs. Playing on a basketball team (which they all still do at Lockheed) also taught them the art of collaboration and braced them for the pressure cooker that is aerospace engineering. "If you can make a free-throw with 2,000 people screaming at you and calling you names, you can handle this," says Anderson, who played small forward for four years at Mines.

Athletics also taught them how to lose sometimes but pick themselves back up again, a lesson Anderson has been forced to draw from more than once in his aerospace career. He oversaw the electrical power systems (which, as an aside, worked perfectly and were not blamed) on the failed Mars Climate Orbiter, a robotic space probe that famously disappeared and then disintegrated in 1998. He was also on the team that helped

build the Mars Polar Lander, which failed to communicate after descent and is presumed to have crash landed on Mars in 1999.

"These failures were very tough to get through, but in the end—just like in basketball—you had to have a longer-term vision and some perseverance and work your way out of it," he says. "Ultimately, when you think about it, they led to the next generation of planetary vehicles that have been unbelievably successful." They also led him to Orion.

### A NEW ERA OF DEEP SPACE EXPLORATION

The Orion project has a billion-dollar annual budget and an aggressive time schedule that looks like this: In 2018, NASA will test its new 77-ton Space Launch System (the largest rocket ever built), which will hurl Orion to a distant retrograde orbit around the moon. In 2021, four astronauts will climb into the pod (which is about the size of a small dorm room), for a 21-day journey to an asteroid on the far side of the moon to conduct research. Around 2030, they'll embark on a six-month trip to Mars. Eventually, its architects hope, multiple Orions will be running missions to Mars.

But sending people into deep space comes with unique engineering challenges, McKay says. The International



*This artist's conception shows the Orion spacecraft on its way to Mars. Orion is the only crewed spacecraft designed to withstand the punishing journey to other planets, protecting astronauts from dangerous radiation, providing software that navigates in deep space, and eliminating the risk of single-point failures through layers of backup systems.*

Space Station orbits the Earth about 460 km away—relatively close in the grand scheme of things. Deep space is exponentially farther, with the moon hovering 384,400 km away, and Mars at 55,700,000 km from Earth. With that distance comes communications challenges. (A signal sent from Mars to Earth takes 30 minutes to get here and back). The radiation is also intense, which can be hard on people and equipment. And when the spacecraft re-enters the

Earth's atmosphere after traveling such a distance, its surface temperature rises to more than 4,000 degrees (Fahrenheit)—making it tough to keep the spacecraft's interior habitable for humans.

"We even have a requirement for how loud the toilet onboard can be," McKay says, noting that the one on the space station is so loud, astronauts have to wear ear protection when they use it.

*Heather McKay '07 (middle) and Eric Coffman '04 (second from left) in their "bunny suits" in the clean room at Kennedy Space Center, with part of the Lockheed Martin team that installed the Orion Crew Module Liquid Propulsion System. The system flew as part of the Orion Exploration Flight Test One (EFT-1) in December 2014.*







*Heather McKay stands in front of the Exploration Flight Test-1 (EFT-1) Crew Module in the clean room at Kennedy Space Center. All personnel in the clean room wear "bunny suits" to prevent foreign objects and debris from contaminating the spacecraft.*



Each of the 38 Mines alumni working on Orion serve a slightly different role. McKay originally worked on the Launch Abort System, a trio of rocket motors designed to pull the space module away from the booster and return it safely to the ground in case of an emergency during launch. For the past several years, she's turned her attention to the liquid propulsion system that ensures the module lands on target when it re-enters the atmosphere.


Meanwhile, Anderson headed up a team of 160 people at Lockheed and hundreds of other subcontractors around the country working on avionics—"essentially all electrical hardware on the vehicle, including the computers, the batteries, the wiring, the communication equipment, and the guidance and navigation hardware." Software specialist Kim Fleming '01 focused her efforts on integrating software and hardware onboard. "I always wanted to be an astronaut as a kid, but in a way this has been more interesting and gratifying for me," she says. "I get to build it."


On launch day, many of them gathered before a giant screen at the Hilton in Cape Canaveral, Florida, as Orion rose to 3,600 miles above the earth; circled twice, hitting speeds of 20,000 miles per hour; and decelerated toward the ocean on the other side of the country. A hush came over the room as

Orion re-entered the earth's atmosphere and appeared on screen, 11 giant parachutes slowing its speed as it plummeted toward the water. The cheers erupted. "It was a flawless flight test," says McKay.

Now, she and her colleagues are busy analyzing the 1,200 sensors aboard the flight to get a better sense of the temperatures, loads, and stressors Orion will encounter in deep space, and to make sure the craft is ready to withstand these pressures when humans come aboard.

In their spare time, McKay and O'Hayre are also reaching out to future engineers to enlighten them on a mission they could someday be a part of. Prior to the December 5 launch, they spoke to the Mines Space Society and Rocket Club, inspiring members to rise at 4 a.m. in their dorm rooms to watch the launch. They also offered live Q&A video presentations from their workstations at Kennedy Space Center, allowing students in classrooms nationwide to pose questions about everything from what kinds of insects have been up in space, to what it takes to become an astronaut.

"I tell them, 'The first person to go to Mars is probably in middle school right now,'" says McKay. "That could be you." 



In February 2005, a research team led by microbiologist John Spear set out to study geothermal ecosystems in the hot springs of Yellowstone National Park. What they found astonished them: microbial communities in the boiling waters were thriving not on sulfur, as was previously believed, but on hydrogen. The findings, which were published in a cover story of the *Proceedings of the National Academy of Sciences* (2005), provided evidence of the first hydrogen-eating microbes ever identified in an Earthly ecosystem. It may seem a minuscule advance, but it was as if an alien visitor had confirmed the existence of giraffes and could now muse about the prevalence of other possible “herbivores.”

The hydrogen-eaters Spear found ten years ago have since helped fuel a search for microbes capable of surviving in pitch-black depths, subsisting on crumbs of energy that flows from rocks exposed to water. Now, the Mines professor of civil and environmental engineering is co-leading a new five-year, \$7 million NASA effort to spot evidence of such life on Mars and beyond.

Spear, who studies the habits and habitats of microbes using genetic sequencing techniques, is a co-investigator and education/public outreach lead for the new NASA Astrobiology Institute team known as “Rock-Powered Life.” Led by University of Colorado Boulder geochemist Alexis Templeton, the project brings together investigators from nine institutions<sup>1</sup> and collaborators from several others. Its aim is to narrow and refine our search for buried life elsewhere in the galaxy through a better understanding of biology here on the home planet.

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<sup>1</sup>University of Colorado, Colorado School of Mines, Montana State University, Arizona State University NASA Ames Research Center, Michigan State University, the University of Rhode Island, the University of Utah, and the Massachusetts Institute of Technology.

# Going Deep for Far-Out Life

Subsurface life forms that don't need the Sun may hold the key to understanding the possibility of life elsewhere in the universe.

By Todd Neff





John Spear

John Spear nosing around for the smell of sulfide, which can be detected by humans in amounts as small as two parts per billion.



John Spear

John Spear and Alexis Templeton hold samples of gypsum rock while standing on the gypsum diaper at Hare Fiord, Ellesmere Island, Canada.



Laurie J. Schmitt

Microscopic organisms give Yellowstone's Sunset Lake its bright colors.



“As an institution, Mines has been thinking about rocks, minerals, and mining for its entire history,” said Spear. “Now, people like me come along and think about how minerals drive life not only on Earth, but on Mars and other places.”

For those of us who associate life with the Sun, the idea of life below the surface may take some conceptual rejiggering. As surface-dwellers, the only life we see is photosynthetic life. The autotrophs, such as plants, derive solar energy from photosynthesis; then we heterotrophs eat the plants and/or the creatures that eat the plants. But as Spear will tell you, there are vast kingdoms of microscopic life—many of them recently discovered—that don’t need the Sun at all. And that’s precisely what the NASA Astrobiology Institute and Spear’s team are looking for.

The Rock-Powered Life investigation involves a combination of field work and theory to understand the conditions in which chemolithoautotrophs (organisms that sustain themselves on energy derived from chemical changes in rock) can exist, and to identify how the very presence of these microbes alters the rocks they host. By examining the temperatures, pH levels, trace element concentrations, and energy gradients needed to support metabolism, the team hopes to identify the types of microbes and microbial communities that are undergoing the chemical processes necessary for life.

The term astrobiology may sound “far-out,” but Spear’s quest will focus on deep, damp, and dark places. The team’s work will hinge on the microbes they find in serpentinite rocks below sites in California, Oman, and the Atlantis Massif in the North Atlantic. Common among these three sites is a mineral called peridotite—an ultramafic rock (meaning rich in magnesium and iron) that is a mainstay on Earth, as well as in the rocky bodies of our solar system and beyond.

NASA’s interest in spending millions to shed light on buried, hydrogen-eating microbes is driven by the laws of physics and chemistry, which scientists suspect may drive universal biological forces. In particular, iron and magnesium commonly blast forth from exploding stars and unite in ultramafic rock. Where there’s enough rock and liquid water to form a habitable planet (scientists estimate there are 8.8 billion habitable planets in the Milky Way galaxy alone), all that ultramafic rock may well be providing fuel for life.

When exposed to water, ultramafic rock undergoes a process called serpentinization, which then yields other kinds of rocks such as magnetite and brucite. But along the way, a significant reaction occurs: the interaction of water and rock releases hydrogen. In the years since Spear first identified these microbes in the boiling waters of Obsidian Pool and Washburn Spring in Yellowstone, scientists have found their hydrogen-eating ilk in much cooler and more geologically pedestrian places—sites that host active serpentinization.

David Des Marais, a senior scientist at NASA’s Ames Research Center and longtime Astrobiology program leader, wonders if the kinds of microbes Spear’s team seeks might be among the metabolic pioneers of life on Earth. That is, maybe the photosynthetic kingdoms we’re all so familiar with were relative latecomers and our photosynthetic bias has blinded us to our own origins. These hydrogen eaters, Des Marais said, “could be indicative of our early history.”

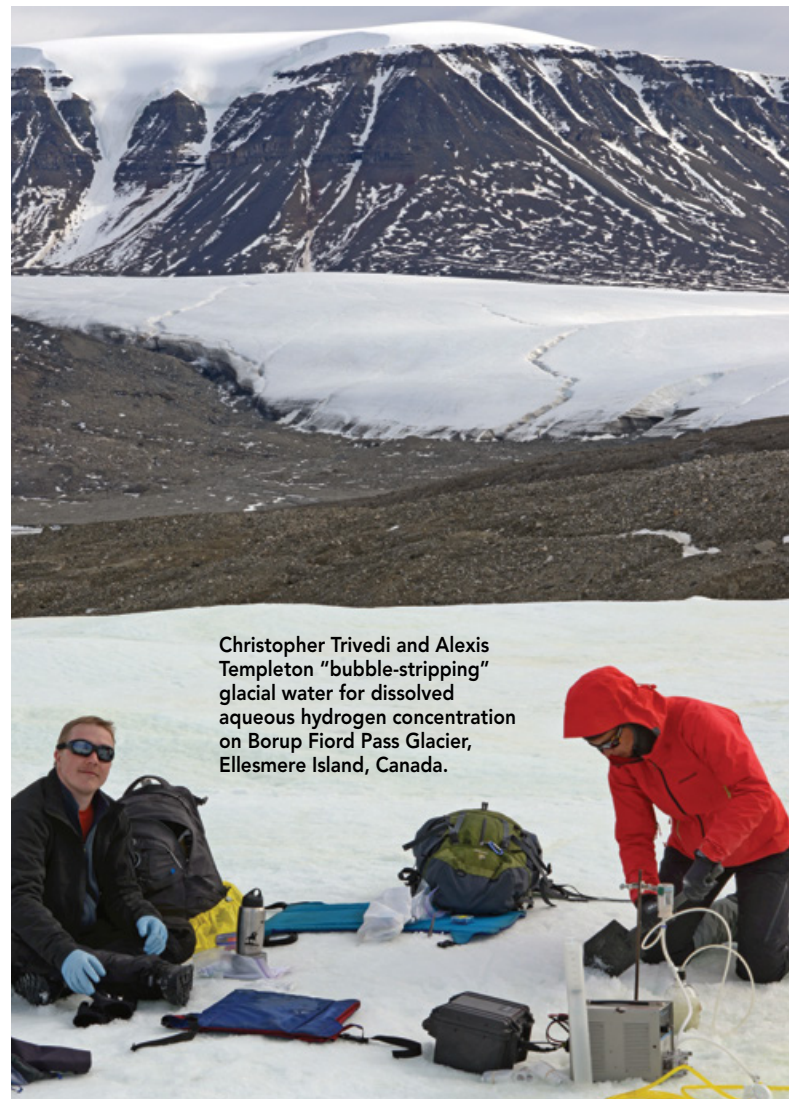
“Maybe they’re our ancestors,” Spear adds.

For Des Marais and NASA, the Rock-Powered Life team’s insights will be most valuable in studying our russet neighbor planet, Mars.

“Earth is the only place in the solar system whose surface environment can support life as we know it,” said Des Marais. “But Mars’ early history indicates a wetter, warmer world, so perhaps life evolved at or near the surface but then persisted only in the subsurface. Everything points to the areas of investigation the Colorado team is pursuing.”

If life had indeed established a foothold on Mars, then perhaps it’s still there. In 2014, the Mars Curiosity team announced the rover had detected methane whose origins, whether microbial or chemical, came from the subsurface. “This is a significant finding, one that opens the door a bit wider for the possibility of life elsewhere,” said Spear.

John Grotzinger, former chief scientist for NASA’s Mars Curiosity mission and now chair of the Division of Geological and Planetary Sciences at the California Institute of Technology, described the team’s goal as more sharply defining the “environmental envelope” of subsurface life. “The kinds of field studies and experiments the team is doing will help us fine-tune and develop a better exploration model,” he says.



Christopher Trivedi and Alexis Templeton “bubble-stripping” glacial water for dissolved aqueous hydrogen concentration on Borup Fiord Pass Glacier, Ellesmere Island, Canada.





John Spear

The Borup Fiord Pass Glacier Astrobiology research team (L to R): Christopher Trivedi, Steve Grasby, Alexis Templeton, Graham Lau, and John Spear.

The studies are particularly relevant to Mars, Des Marais added. “I expect a successful Rock-Powered Life team will help us develop a more sophisticated approach to how we would run rovers in the future, what instruments we would send, and the way we would execute the mission,” he said.

In Oman, below the Atlantic, and at the California Coast Range Ophiolite Microbial Observatory (CROMO), Spear’s team will fill mesh cylinders about the size of a cigar with crushed peridotite, obsidian, glass beads, and other rocks, and then lower the cylinders into the depths for up to a year. The depths will vary from 20 meters in California to 300 meters in Oman, with temperatures ranging from a chilly 13-18 degrees Celsius at CROMO to a near-boiling 90 degrees at the Atlantis Massif. The idea, Spear says, is to see what grows where in different environments.

Back in the lab, the painstaking work will commence, as the team inspects the rocks under scanning-electron and epifluorescent microscopes to look for cells and signs of metabolism. Next, they’ll extract DNA and use genetic sequencing techniques to assign creatures to the proper twig on the tree of life. Then it’s off to the newer techniques of modern biology—including metagenomics, metatranscriptomics, and single-cell genomics—the aim being to understand what combinations of microbes are present and how they subsist.


The metagenomics work will involve sequencing most of the DNA

from the many microbes in a sample. With that, Spear says, you can infer some community traits. “Do I see hydrogenase genes, and can I infer from their presence that the community is metabolizing hydrogen? Metagenomics gives you the background in terms of what’s possible in a community,” he said.

Metatranscriptomics will look at messenger RNA to see what genes are being expressed. “It tells you not only who’s there, but who’s metabolizing and how,” Spear says.

Single-cell genomics involves isolating the DNA of an individual microbe from a community and sequencing its entire genome to provide a more thorough understanding of the microbial mass. For this step, Spear’s team will work with the Bigelow Laboratory for Ocean Sciences and the Joint Genome Institute. Spear says he wouldn’t be surprised to come across entirely new kingdoms of the tree of life. “It’s like walking out the door and finding animals and trees for the first time,” he said.

In addition to his work in the laboratory, Spear is involved in education and public outreach efforts, such as bringing astrobiology to Native American tribal colleges and developing a “virtual minor” online astrobiology course for undergraduates. The key message, he says, is that astrobiology is both far-out and not so much.

“We need to better understand us—us being this organism I call Earth,” Spear said. 

# ALUMNI NETWORK

## SECTIONS PROGRAM

# A Vibrant Alumni Network

**Section:** A community of Mines alumni who strive to stay connected to their alma mater and to one another to celebrate their Mines Pride

No matter where you live or travel, you're bound to cross paths with fellow alumni. With each graduating class, our newest Miners scatter to cities across the globe to launch or continue their personal and professional journeys. One of the first things these new alumni want to know is, "Are there any Mines people there?"

The Alumni Association's Sections Program currently boasts 54 sections around the globe, and getting connected is only a click away ([minesalumni.com/sections](http://minesalumni.com/sections)). Each section is led by an alumni volunteer, or group of volunteers, who serve as ambassadors and event leaders for their local Mines community. By keeping local alumni connected to the school and to one another, staying informed about the latest campus news, and leading the charge in planning events and programs that make the alumni network vibrant, these volunteers extend the reach of the Alumni Association.

E-Days celebrations, new student send-off parties, networking luncheons, professional development opportunities, lectures/receptions with visiting faculty, community service projects, holiday gatherings, athletic events and tailgate parties, happy hour get-togethers, and other events make for a busy calendar. Although the Alumni Association has focused on establishing sections in cities with at least 100 alumni, it certainly doesn't discourage cities with smaller alumni populations from participating in the program (let's hear it for our alumni in Paris and Perth).



Mines alumni in The Woodlands, Texas, proudly sported their Mines bandanas at a happy hour gathering in January.

### ALUMNI BY THE NUMBERS



**Largest alumni populations in US (outside of CO):**  
Houston, Dallas, Seattle

**Smallest alumni populations in US (outside of CO):**  
Las Vegas, NM; Palm Desert, CA; Wichita Falls, KS

**Efforts to grow and enhance the program have been in full swing.**

**Since October 2014, several new cities have joined or renewed their participation in the Sections Program lineup:**

Austin, TX  
Boston, MA  
Chicago, IL  
Colorado Springs, CO  
Las Vegas, NV  
London, United Kingdom

Midland, TX  
Minneapolis, MN  
New York City, NY  
Reno, NV  
Salt Lake City, UT  
San Antonio, TX

San Diego, CA  
Santa Fe, NM  
St. Louis, MO  
The Woodlands, TX  
Tucson, AZ  
Washington, D.C.

For a complete list of sections, visit [minesalumni.com/sections](http://minesalumni.com/sections). If you are interested in getting involved with your local section, or if you'd like to get one started in your area, we'd love to hear from you. Contact the CSMAA office at 303.384.2143 or email [rujones@mines.edu](mailto:rujones@mines.edu).

**Celebrate your Mines pride!**



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Mines alumni in Spokane/Coeur d'Alene gather for E-Days 'Round the World.

Mines alumni in Albuquerque display the Mines banner at E-Days 'Round the World.



Denver Metro alumni head for the hills on a hike to the summit of Mt. Bierstadt in Colorado.



## ON OUR WALL

### Have you worked in the space industry? What interesting projects have you been involved with?



I am working for Oceaneering Space Systems, currently supporting NASA's Goddard Space Flight Center's satellite robotic refueling mission.  
—Peter Carow '13

I work for the company Arianespace, and last year we launched 23 satellites. We are also very excited about the development of our new rocket, Ariane 6, which should be operational by the end of the decade.  
—David Vivanco MS '03

I just returned from the Baikonur Cosmodrome in Kazakhstan, the world's first and largest space launch facility, after launching the Inmarsat 5-F2 satellite on a Proton rocket on February 1, 2015. I work for Boeing, and my team spent approximately 30 days in Baikonur processing and preparing the spacecraft for launch.  
—Reinhold Huber '97

I have been working on flight software (on-board) and ground support software for nano-satellites. These are about the size of a shoe box and weigh less than 10 pounds. The on-board processor is the equivalent of your cell phone. We have two in orbit today and have built another 20.  
—David Chazin '77

I am a satellite remote sensing oceanographer and scientific software engineer currently supporting the Ocean Biology Processing Group (OBPG) at NASA's Goddard Space Flight Center. I develop and test supercomputer image processing algorithms for using satellite imagery to map and measure ocean photosynthetic phytoplankton concentrations (marine algae), or ocean color.  
—Robert Lossing MS '11

I currently work with United Launch Alliance as a software and avionics quality engineer. The most interest-

ing project I worked on last year was the Delta IV Heavy Launch Vehicle that launched the Exploration Flight Test 1 (EFT-1) Spacecraft. My job was to oversee the quality of the flight software for the Launch Vehicle during development and test.  
—Becky Vigil '05

I am working at Marshall Space Flight Center on the NASA Space Launch System performing avionics and software system safety engineering and probabilistic risk assessment fault trees. I review hazard reports for all systems.  
—Robert Patlovany MS '94

As an airline pilot, I managed to survive multiple airline employer bankruptcies by persistently enrolling in courses for additional degrees and applying the knowledge to space commerce. Starting with a 1967 UCLA BA degree in math, my 6th degree is a Mines ME MME degree received in 2010 that will facilitate my contribution to space resource

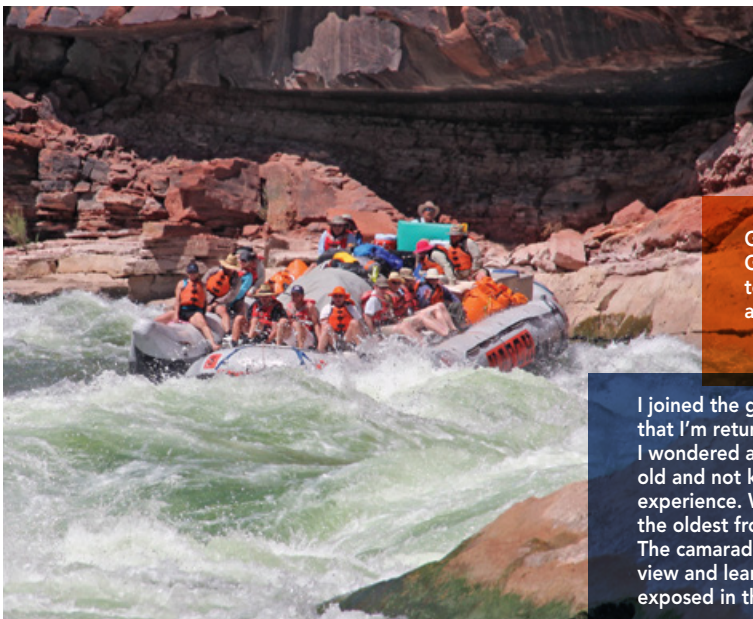
mining as well as energy and water resource development. This spring semester I'm currently taking the last required online course for the UCCS ME Space Operations degree.  
—William Good M ENG '10

I work at NASA's Langley Research Center on electronic photodetector interface networks intended to decrease the minimum detectable optical signal while also decreasing overall quantity of data collected for a given experiment. One typical application would be for LIDAR-based atmospheric measurements.  
—Dave McGlone PhD '96

My company provides program management consulting for the capital facilities for aerospace cleanrooms. We deal with the design and construction of the high-tech buildings that are then used for component manufacturing and satellite assembly.  
—Eric Wilson '94, MS '04



Join the conversation! Like us at [facebook.com/minesalumni](https://facebook.com/minesalumni) and join our CSMAA group on LinkedIn.



## GRAND ADVENTURE IN THE CANYON

Fellow alumni, family, and friends will embark on an adventure of a lifetime: a river raft trip through the Grand Canyon on May 23-30, 2015. Join the waitlist for next year's trip (May 22-28, 2016), and learn more at [minesalumni.com/canyon2015](https://minesalumni.com/canyon2015).

Greetings fellow river runners and future river runners! I will be the 2015 Grand Canyon Adventure Guide for alumni, families, and friends. I'll teach you how to read rock and new ways to listen, observe, be aware, and relax. Don't forget that it's never too early to start hydrating!

—Lewis Kleinhans PhD '91

I joined the group last year and had such a wonderful experience that I'm returning again this year, along with six family members. I wondered ahead of the trip how it would play out, me being 80 years old and not knowing anyone else. Well, it was an absolutely fantastic experience. We had seven decades of Mines graduates, including me, the oldest from the class of 1956, and Nick Martin, a 2014 graduate. The camaraderie was outstanding. That coupled with the ability to view and learn about the three billion years (and more) of geology exposed in the Canyon made the trip both enjoyable and educational.

—Bill Yopp '56





## COLORADO SCHOOL OF MINES RECENTLY\* RECEIVED 20 OUTSTANDING LEADERSHIP GIFTS AND COMMITMENTS:

**Apache Corporation** committed \$2 million to support labs, students and initiatives within the Departments of Geology and Geological Engineering, Geophysics and Petroleum Engineering, as well as an additional \$17,825 to support geology and geological engineering and E-Days.

**A. Frederick Banfield Jr.** '64 made gifts totaling \$2.5 million to establish The Fred Banfield Distinguished Chair in Mining Engineering and \$100,000 to support the mining department computer laboratory.

**Chevron** made gifts totaling \$256,500 to support scholarships, student organizations, and several programs and initiatives across the Mines campus.

**The Adolph Coors Foundation** made gifts totaling \$226,000 in support for the Herman F. Coors Professorial Chair in Ceramics and the William K. Coors Distinguished Chair in Chemical Engineering.

**Joe Coors Jr.** and **Gail Coors** made a gift of \$250,000 in support for undergraduate student scholarships.

**Members of the Coors family**, including several Mines alumni, pledged \$4 million in support of the CoorsTek Center for Applied Science and Engineering.

**Marshall C. III** '67 and **Jane Crouch** and the **Marshall & Jane Crouch Family Foundation** made gifts totaling \$200,000 in support for programs and initiatives across the Mines campus, including faculty and student support in the Department of Geology and Geological Engineering, Athletics and The Mines Fund.

**Epilog Laser** made a gift of \$100,850 in support for the Electrical Engineering Showcase Laboratory.

**ExxonMobil** made gifts totaling \$179,000 in support for the Unconventional Natural Gas and Oil Institute, student organizations and several academic departments.

**Freeport-McMoRan Foundation** made a gift of \$1 million in support for the Edgar Mine renovation project.

**GE Oil & Gas** made a gift of \$150,000 in support for the Unconventional Natural Gas and Oil Institute.

**Jerry** '68 and **Tina Grandey** made gifts totaling \$501,091 in support for programs and initiatives across the Mines campus, including Marv Kay Stadium, the Earth Resources Institute and The Mines Fund.

**Fred** and **Barbara Holmes** committed \$1 million to name the PVT Research & Fluid Characterization Laboratory in Marquez Hall.

**Harold M.** '68 and **Patricia M. Korell** made gifts totaling \$150,000 in support for Mines Men's and Women's Basketball.

A bequest distribution of \$252,140 from the estate of **Clifton M. McDaniels** '50 will provide unrestricted support for Mines.

**Newmont Mining Corporation** made gifts totaling \$174,000 in support for programs and initiatives across the Mines campus, including faculty and student support in the College of Engineering and Computational Sciences, the College of Applied Science and Engineering, the Geology and Geological Engineering Department, the Mine Rescue Team, E-Days and the Society for Mining, Metallurgy and Exploration.

**Neal E.** '68 and **Margaret R. Schmale** made a commitment of \$100,000 in support for the Schmale Family Board of Trustees Honors Scholarship Fund.

**Stephen A. Sonnenberg** '81 made a commitment of \$100,000 to establish the Sonnenberg Endowed Graduate Fellowship Fund (part of the Board of Trustees Honors program) and a gift of \$1,000 for the Geology and Geological Engineering Department.

**Shell Oil Company** made gifts totaling \$100,500 in support for programs and initiatives across the Mines campus, including senior design, the Multicultural Engineering Program, and for faculty and student support in the Departments of Geophysics, Geology and Geological Engineering, Chemical and Biological Engineering and Petroleum Engineering.

**James R. Weber** '71 made gifts totaling \$100,000 in support for the Weber Endowed Fellowship Fund and for the Geology and Geological Engineering Department.

### GENEROUS GIFTS AND COMMITMENTS OF \$25,000 AND MORE:

ArcelorMittal USA  
ARCS Foundation Inc.  
Lawrence E. Barrett '50  
R. Timothy Bartshe '71, '73  
John L. '74 and Marilyn Bedwell  
BP  
Deborah K. Broomfield  
Jerome T. Broussard '64  
Cameco Corporation  
Charles J. Canepa  
Ed Chuey

David R. Cole '52, '56  
Stephen P. '67, '69 and Ann Collings  
David F. '43, '47, '61 and Ruth C. Coolbaugh  
Glen and Barbara Farber  
Weldon D. Frost '52  
Gordon L. Gray '50  
Halliburton Foundation  
Alfred T. Ireson '48  
Hossein and Bonnie Kazemi  
Sarah W. "Sally" Klein  
Francis J. '52 and Mary Labriola

John P. '52 and Erika H. Lockridge  
Rob III '68 and Ann McKee  
Aprill M. Nelson '08  
Newfield Exploration Company  
Andy '79 and Suzanne Peterson  
ResEnergy  
Barbara C. Scotland  
Seay Foundation  
Mike '94, PhD '97 and Missy Stoner  
Viola Vestal Coulter Foundation

\*The CSM Foundation received the gifts and commitments listed here between 9/1/14 and 12/31/14.



# CLASS NOTES

1955

**Robert A. Metz** is the chairman, president, senior vice president of exploration, and director for Professional Minerals Development in Tucson, AZ.

1964

**A. Frederick Banfield Jr.** is the CTO for MineSight in Tucson, AZ.

1969

**Craig E. Moore** is the president for Texas Energy Patriots and lives in Houston, TX.

**E. Stuart Nelan** is a manager of software development and support for Global Geophysical Services in Dallas, TX.

1970

**Mohamed A. Al-Sofi** is an executive managing partner and vice chairman for Arabian Consulting Engineering Centre (ACEC) in Al-Khobar, Saudi Arabia.

**James B. Blackburn** is the owner of Fired Earth in Banbury, Oxfordshire, United Kingdom.

**Howard G. Clark III** is a master electrician and the owner of FNS Electric in Las Vegas, NV.

**Kenneth L. Manning** is a process manager for American Vanadium and lives in Spring Creek, NV.

**Guy W. Schlink** is the owner of Blink, Inc. in Everett, WA.

1971

**Anita L. Peil** is a director for Europa Rx in London, United Kingdom.

1972

**Theodore C. Borer** is a senior program manager and principal II for Tetra Tech in Boulder, CO.

**D. Victor Bush** is a global energy program manager for EnerNOC and lives in Midvale, UT.

**Richard A. Cadle** is a principal engineer for Billfinger Tepsco and lives in Arlington, TX.

**Gerald P. Zink** is a co-owner of StoneAge, Inc. in Durango, CO.

1973

**James R. Hitt** is the president of James R. Hitt Mining Enterprises in Sandy, UT.

1974

**John F. Dlouhy** is a senior geological advisor for California Resources in Los Angeles, CA.

**Benjamin W. Guenther** is senior vice president of operational strategy and reliability for AngloGold Ashanti in Greenwood Village, CO.

**Timothy O'Connor** 

**Kenneth R. Parrott** is working for Whiting Petroleum and lives in Golden, CO.

1975

**Gilson F. E. Abrahao** is an operations and project delivery consultant for Seal Telecom in Sao Paulo, Brazil.

**Ahmet Ercan** is a professor at Istanbul Technical University in Sariyer, Istanbul, Turkey.

**John D. Fix** is a capital advisory senior consultant for Leidos and lives in Westminster, CO.

**Gregg J. Hodges** is a general manager for Ausenco Denver in Greenwood Village, CO.

**Glenn L. Krum** is an artist for Exxon Mobil and lives in Seabrook, TX.

**Amos G. Mfite Basaza** is chairman of the technical petroleum committee for the Ministry of Energy and Mineral Development in Uganda.

**Jamal H. Munshi** is a professor emeritus at Sonoma State University in Rohnert Park, CA.

**Kirk A. Nobis** is an engineer for KAN in Salt Lake City, UT.

**Charles G. Pitcher** is a director for Redhawk Resources in San Manuel, AZ.

**Gary L. Prost** is a senior staff geologist, Oilsands Team, for ConocoPhillips in Calgary, Alberta, Canada.

**Robert F. Unger** is the CEO for Excalibur Resources and lives in Dallas, TX.

1976

**Stephen E. James** is a plant manager for Nyrstar Clarksville in Clarksville, TN.

**Kenneth M. Slack** is the president and COO of Performance Associates International in Tucson, AZ.


**Leon Munyan** 

1977

**Howard A. Fuchs** is a professor of medicine for Vanderbilt University in Nashville, TN.


**Ron J. Vasquez** is a manager of an innovation hyperlab for Aurora Public Schools and lives in Arvada, CO.

1978

**John P. Griffith Jr.** is a partner for Xio Partners and lives in Charlotte, NC. 

**Billy W. Harris** is vice president of engineering for Elk River Resources and lives in Midland, TX.

**R. Scott Rutherford** is a geophysicist consultant for SK Production in Boerne, TX.

 denotes an individual who has recently posted photos at minesalumni.com



## DISTINGUISHED MEMBERSHIP

**AWARD** Maria A. Capello MS '95, directorate consultant at Kuwait Oil Company, was honored with the Society of Petroleum Engineers (SPE) Distinguished Membership at SPE's Annual Technical Conference and Exhibition held last October in Amsterdam, The Netherlands. As a key member of the SPE Talent Council since 2010, Capello was acknowledged for her efforts in helping to shape initiatives related to gender, cultural diversity, and dual career couple issues; mentoring and supporting SPE members in the Middle East region; and serving in leadership roles for SPE events. She also serves as the CSM alumni section leader for Kuwait.



**10<sup>th</sup>**  
**ANNUAL**



**ALUMNI ASSOCIATION**  
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# **E-DAYS**

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Assured Flow Solutions (AFS) is an oil and gas flow assurance consultancy which specializes in production chemistry, fluid flow and operations support with offices in both Houston and Denver. AFS is staffed with multiple CSM graduates and is the proud sponsor of E-Days 'Round the World.

To learn more, visit [www.assuredflowsolutionsllc.com](http://www.assuredflowsolutionsllc.com).

1979

**Richard L. Hesseltnie** is an executive vice president for Ceritas Energy II in Houston, TX.

**William J. Knight** is working for Sirius Technical Services and lives in Mobile, AL.

**Richard C. McNealy** is an engineer for Chevron and lives in Houston, TX.

**John J. Nicholl Jr.** is a principal scientist for URS and lives in Littleton, CO.

**Raymond D. Priestley** is an engineering advisor for DJ Development in Western Operations for Encana in Denver, CO.

**Russell W. Truby** is HES regulatory manager for Callon Petroleum in Houston, TX.

1980

**Kathleen A. Altman** is director of metallurgy and mineral processing for Roscoe Postle Associates USA in Lakewood, CO.

**Barbara F. Fullmer** is a general counsel for ConocoPhillips Alaska in Anchorage, AK.

**Russell W. Kemp** is vice president of manufacturing for Innophos in Cranbury, NJ.

**Robert Pickard** 

**Richard P. Smiley** is director of operations for Memorial Resource Development in Houston, TX.


1981

E. James Bergamo Jr.  
J. Scott Jones   
Wendy (Angell) Myers   
Daniel L. Sikorski  
Charles R. Wagner


1982

Mark E. Bush  
Russell Gillis   
Ira Pasternack  
J. Wesley Powell  
Thomas O. Rice

1983

Richard M. Cieslewicz  
Todd R. Habliston   
Celia McMullen Hadden  
Dennis A. Lobbmeyer  
Norma I. Mozeé  
Paul R. Weller

1984

W. Chapel Allen   
Barton R. Brookman Jr.  
Michael James Glen  
Matthew C. Holdeman  
Michael J. Kendrick  
Nancy K. Little

1985

Shelley (Nemanic) Curtis  
John W. Flanigan  
Daniel S. Gralla  
Timothy J. Kindvall  
Mitchell J. Kruse  
Joseph D. Kuhach Jr.  
Curtis L. Lightle  
David-John Roth  
Stephen P. Smith  
Robert F. Woods

1986

Souad N. Al-Azzawi  
Jeffrey L. Allison  
David W. Barber  
Kristina A. (Huyck) Carter  
Kirsten L. Derr  
Gregg S. Hofland  
John P. Kleckner  
John G. Kunkle  
Robert M. Palermo  
Duncan W. Riley Jr.  
Scott A. Steinke  
Michael T. Tapia  
Beverly J. (Blank Moon) Zabel

1987

JoAnn H. (Hurley) Euler  
Laurie M. (Franchini) Flanigan


1988

John J. Christmann IV  
Trent M. Doyle  
Karl E. Hofmann  
Brian P. Shea  
Patricia A. Stewart

1989


Wenjie Dong  
Paul E. McElligott  
Brian K. Owens  
Suzanne M. Persyn  
L. Andrew Torres

1990

Ahmed M. Al-Marzoug  
Mohammed A. Al-Naafa  
Brett D. Ashford   
Richard M. Barratt  
Dinesh N.S. Dhakal  
Folke L. Engelmark

**Editor's Note:** Alumni from the classes of 1981 to 2014 who have recently updated their employment information online or have uploaded photos to minesalumni.com are listed below. In addition, all class notes published in *Mines* magazine since 2008 are available on the site. For online viewing instructions, click on Class Notes at minesmagazine.com.

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Executive Leadership Coach  
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303-690-7661  
[kim@CoachKimMiles.com](mailto:kim@CoachKimMiles.com)

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**ALUMNI ASSOCIATION  
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Rozi Kasa  
 Victor Romero   
 Manuel G. Schellman  
 Morales  
 Marcos L. Schroeder  
 Pramote Sooksomporn  
 Dirck E. Tromp  
 Steven A. Werner  
 Mark T. Young

**1991**  
 John D. Jensen  
 Steven R. Klimowski  
 Margery J. Lemieux  
 Ahmed A. Zugail

**1992**  
 Calvin J. Feik  
 Carlton Hamrick Jr.  
 Arlie C. Huffman III  
 Jeffrey A. Johnson  
 Edward D. LaFehr  
 Mark S. Morgan  
 Alisa L. Ramey  
 James K. Roudebush  
 John L. Strobel  
 Scott R. Werner

**1993**  
 Jeffrey S. Brown  
 Ulf A. Kutschera

Michael G. Lindsey  
 Howard A. Roepnack  
 Danny E. Simpson  
 Timothy B. Toussaint

**1994**  
 Mark D. Boone  
 Scott M. Denton  
 Taras Y. Makogon  
 Craig R. Walters

**1995**  
 Corey F. Hartwig  
 Austina C. Matthias  
 David B. Price  
 Robert W. Reisinger  
 John R. Starritt  
 Sean M. Trautman  
 Scott A. Walker

**1996**  
 Frank J. Filas  
 Peter A. Frazier  
 Lee L. Landkamer  
 Eleonora A.  
 Lein-Stevens  
 Kendra L. (Sublette)  
 Lema  
 Paul V. Salaz Jr.  
 Scott R. Walker

**1997**  
 Jeffery R. Barnes  
 Tyler K. Faulk  
 Tiffany A. Horn  
 Jason M. Tracewell

**1998**  
 David A. Bragg  
 Duane J. Cleere  
 Kevin D. Nelson  
 Eric C. Pleiman  
 Preston K. Reichert  
 Derek R. Trebilcock

**1999**  
 Corinna (Holmes)  
 Fenton   
 Michael D. Galiunas  
 Jeremiah E. Holland  
 Jason Le Gore  
 Ever Martinez  
 Sarah (Vega) Watkins  
  
 Alexis K. (Bloomfield)  
 Wool

**2000**  
 Faisal A. Aljalahah  
 Lee Becker  
 Scott Bennett   
 Diana Harris Herrero

Maja Imamovic  
 Tiani Jones  
 Amy L. McClenathan  
 Lia N. Sedillos  
 Jacob W. Shumway

**2001**  
 Gregory D. Bensen  
 Jacob J. Benson  
 Forrest H. Buckner  
 Nicolas M.P. Flannery  
 Stephen W. Grigel

**2002**  
 Jacob B. Kapp  
 Eduardo J. Morillo

**2003**  
 Patrick I. Anderson  
 Imran Alam Arain  
 Scott R. Brown  
 David L. Hilburg  
 Chip D. Karo  
 Nicholas A. Koster  
 Matthew L. McKenna  
 Keith P. Swedhin

**2004**  
 Jeremy A. Beard  
 Jennifer M. Lazetera  
 Cristian H. Malaver



**THIRD GENERATION OREDIGGER**  
 Suzanne (Pearson) '04 and Wade Clerkin '03 welcomed Adelynn Chelsea Clerkin on June 27, 2014. Suzanne and Wade both work for Shell Oil Company in Houston, Texas. At six months old, baby Adelynn paid her first visit to the Mines campus to take photos with her grandparents Linda and Bill Pearson '70.

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**Stanley Gradisar**  
 Patent Attorney,  
 Of Counsel  
 B.S., Mining Engineering, 1974



**Kristen Gruber**  
 Patent Attorney, Associate  
 B.S., Chemical and Petroleum Refining  
 Engineering, 2000



**Bruce Kugler**  
 Patent Attorney, Shareholder  
 B.S., Petroleum Engineering, 1981



**Matthew Ellsworth**  
 Patent Attorney, Shareholder  
 B.S., Engineering, with honors, 2003  
 M.S., Engineering Technology Management, 2005  
 Top Graduating Electrical Engineer



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



**Cliff Brazil**  
 Patent Attorney, Associate  
 B.S., Metallurgical & Materials  
 Engineering; Minor Bioengineering  
 & Life Sciences, 2011



**Brad Knepper**  
 Patent Attorney, Shareholder  
 B.S., Electrical Engineering, 1998

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**FIRST KISS IN HOTCHKISS** Nicole Davis '14 married Evan Hanson on July 5, 2014, in Hotchkiss, Colo. Other Mines alumni who attended included Chelsea Newgord '12, Penny Rogers '12, Caitlin Kodweis '13, Rebecca Wienand '14, Brandon Hunton '14, Erica Kellenberger '14, Jessica New '14, Aaron Faulkner '14, Fangyu Gao '14, Xinwei Yan '13, and Zachary Fisher '13.



**ROCKY MOUNTAIN WEDDING** Amanda Prebarich '10, MS '11 and James Molde '09, MS '10 were married on September 20, 2014, in Lyons, Colo. The couple met when they were students while working for Admissions and Financial Aid. Amanda is a process engineering consultant for AECOM, and James works as a project manager for ProLink Solutions. Mines alumni in attendance included best man Scott McDowell '09, groomsman Nathan Walden '09, and guests Megan (Fry) Fehr '06, MS '12, Stuart Fehr '06, MS '07, Sabina Gade PhD '10, Kristin Magers '08, Michael McMonigle '09, Rachel (Ballantyne) Meints MS '10, Zach Meints '09, MS '11, and Kale Stanton '09.



**WORKPLACE CHEMISTRY** On December 14, 2014, Peter Eliassen '09 married Kristin Neddenriep at Valhalla, South Lake Tahoe, Calif. After graduating from Mines, Peter worked in Reno, Nev., for Firth Rixson Forged Rings (now owned by Alcoa), where he met Kristin, who is a graduate of the University of Nevada, Reno. Mines alumni in attendance included Justin Smith '09, Corey Jones '09, MS '10, Grace Bucenec '11, Keith Roman '10, Kenneth Dodson '09, Andrew O'Loughlin '09, Jonathan Lanning '09, and Joseph Durlin '09.



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Jennifer L. (Seder) Schenkman  
 Anthony D. Steeples  
 Hossein Forough Tabrizi  
 Michelle L. (Powis) Wieck

**2005**  
 Bonnie (McCoy) Birckenstaedt 📷  
 Naif M. Al-Sadhan  
 Kevin H. Barrett  
 Nathaniel J. Dick  
 J. Ben Lackey  
 Andrew M. Montano  
 Christopher E. Schneider 📷  
 Andrew R. Smith  
 Daniel R. Ward

**2006**  
 Nathan J. Call  
 Dimitri R. Dounas-Frazier  
 Sean J. Finnegan  
 Gustave M. Friesen  
 Matthew E. Mientka  
 Daniel J. Rabiolo  
 Brandon L. Segura  
 Phillip P. Zelenak

**2007**  
 Amrut Athavale  
 David R. Bernard  
 Kyle A. Fitzpatrick  
 Justin T. Green  
 Christopher R. Jack  
 Marin Matesic  
 Adam D. McCormick  
 Katherine J. (Smith) Millener  
 Caleb A. Ring  
 Clay A. Rosson  
 Christopher M. Seick  
 Thomas C. Wells

**2008**  
 Afolabi O. Babalola  
 Noah W. Brooks  
 Alyssa K. Cobb  
 Joseph Dumesnil 📷  
 Elizabeth K. Duncan  
 Sean P. Fahey  
 Emily (Milian) Gonzales 📷  
 Richard M. Gonzales 📷  
 Aaron J. Heun  
 Daniel J. Iverson  
 Brent A. Koren  
 Kevin McCash

Casey D. Morse  
 Mathew T. Oliver  
 James R. Reeves  
 Stefan J. Revielle  
 David N. Richards  
 Liyu Sun  
 Christopher M. Tipple  
 Wentz R. Wensel  
 Cory A. Whitton

**2009**  
 Jeremy A. Brown  
 Justin J. Corwin  
 Kenneth D. Dodson  
 Peter C. Eliassen  
 Matthew J. Hurliman  
 Christopher M. Huter  
 Braden R. Kappius 📷  
 Kyle D. Lieurance  
 Kelly V. Lindholm  
 James McCall 📷  
 Ross H. Melton  
 Amy C. Moss-Russell  
 J. Ray Runyon II  
 Danielle L. (Saulsbery) Vinnola  
 Elizabeth W. Wachel

**2010**  
 Joshua M. Black

Lacy M. (Taylor) Boughdadly  
 Bailey R. Christenson  
 Joseph Corder 📷  
 Taylor H. Embury  
 Stefanie N. Frelinger  
 Hudson L. Grigg  
 Michael D. Halsema Jr.  
 Beau D. Judge  
 Evan J. Lindenbach  
 Ian Littman  
 Kevin D. Lock  
 Thomas Mason 📷  
 Danielle M. Nihiser  
 Sean P. O'Brien  
 Lewis S. Patterson  
 Rachel E. (Heinle) Rabun  
 Ryan H. Rowland  
 Allison E. Satterfield  
 Nathan E. Schmitz  
 Christopher N. Siok  
 Tyson J. Swinford  
 Brent N. Vangolen  
 Andrew Wait 📷  
 Arthur C. Wardlaw III

**2011**  
 Eryn M. Ammerman  
 Adam J. Anderson



**GROWING MINES FAMILY** On June 3, 2014, Jennifer Sterner '96, MS '98 married Thomas Heist in Wyomissing, Pa. Their first child, daughter Catherine Renee Heist, joined the family on September 10, 2014.

# Thank you to Encana Corporation

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**GLOBAL CONNECTION**

Current CSMAA Board member Tim Saenger '95 married Dzung Le from Vietnam on February 1, 2014. Although they lived on opposite sides of the globe, modern technology enabled them to find each other. After five visits to Vietnam and one visit to the United States, the couple exchanged vows in Dallas, Texas, in front of their friends and families. The groom's father, fellow Oredigger Eric Saenger '73, Hydrogeo '92, was in attendance. On December 17, 2014, Dzung and Tim welcomed Truman Saenger into the world as the best Christmas gift they could hope to receive.



**BUBBLE, BUBBLE, TOIL, AND BLISS** Emily Mieritz '09, MS '11 and Jimmy Heyne '08, MS '10 were married on July 5, 2014, at Parfet Park in Golden. The wedding party included Mines alumni Dana Drake '10, Jason Hopkins '09, Nick Lubbers '08, Breian Wells '10, MS '12, and Daniel Mieritz '09.



**FRESHMEN MATCH** Hilary Stamp '11 and Chad McKenna '11 were married on June 7, 2014, at Fossil Trace Golf Course in Golden, Colo. Hilary and Chad first met during freshman orientation weekend at Mines and worked together as resident assistants for the next two years. Mines alumni in the wedding party were Blake McKenna '09 (groom's brother), Kyle Quintero '12, Jacob Herzog '12, and Jay Williams '12. In attendance were Bryan Euser '11, Penny Rogers '12, Marie Hrdlicka '13, Kylie Makuh '12, Brandon Joy '09, '10, Ben Ohnstad '13, Jerel Miller '12, Josh Dinges '12, Lauren (Keiser) Popp '12, Tim Popp '11, Trish Weisgerber '12, and David Stamp '12 (bride's cousin).

**SUMMER WEDDING AT LAKE TAHOE** Rachael Tanaka '10 and Edward Zamora were married on June 13, 2014, in South Lake Tahoe, Calif. Mines alumni in attendance included maid of honor Nicolle Kindall '10, Devyn Slaughter '10, and Rebecca Egerdahl '10.



**BRIGHT-EYED MINES BABY**

Jacqui (Schmalzer) '07 and Dan Stackhouse '07, MS '08 welcomed their new son, Shane, on September 21, 2014.



**NEW MEMBER FOR A MINES FAMILY** Mark '06 and Kim (Kilmer) Torluemke '05 are busy taking care of Lawrence, born on August 28, 2012, and Joanna, born on June 3, 2014. They celebrated Joanna's baptism near the end of August last year.



ALUMNUS PROFILE

# Around the World...and Back to Mines



Courtesy of Bill Zisch

Bill Zisch gets a dance lesson from local residents during a community celebration in Ghana, West Africa.

“I probably ended up at Mines because I wanted to play football,” said Bill Zisch ’79. “I already had the idea that I wanted to go into engineering, so when Mines said, ‘We’d like to have you play football for us,’ that really caught my attention.”

The offer also reinforced a strong family connection: Zisch’s grandfather, John Zisch, played varsity football for Mines in the 1910s. “Back then, we used to beat CU in football,” Zisch laughs.

The elder Zisch later became a pioneering chemist at the Climax Molybdenum Mine, and though he ended up in the sugar refining industry, “he always considered himself a Mines man.”

So, too, does Bill Zisch, who recently rejoined the CSM Alumni Association’s Board of Directors after a hiatus of more than a decade. A dedicated Mines supporter and donor for more than 30 years, Zisch served on the alumni board in the late 1990s but stepped down when his career took him overseas. Now he’s back in Colorado to stay, and he has a new job as president and CEO of Midway Gold and a fresh start on his service to the alumni board.



Bill Zisch '79

“The primary role of the Alumni Association is to create opportunities and relationships that support the school,” said Zisch. “There are so many Mines alumni out there in industry that this role is magnified. We can help the school understand the world that its students are going to live in, and help prepare those students to become leaders after they graduate.”

Zisch’s own path to industry leadership has taken him all over the world. After graduating from Mines with a degree in mining engineering, he spent 16 years in gold and coal operations with FMC Company, then became Newmont’s globe-trotting chief mining engineer for international operations. He eventually settled in Peru as the operations manager at Yanacocha, one of the world’s largest gold mines. He also spent much of the 2000s in West Africa as a regional vice president.

Zisch’s current job takes him to some of the most remote locations in North America. Midway Gold’s primary assets lie in the central Nevada desert on either side of U.S. 50, which is famously known as “the loneliest road in America.”



Thankfully, he avoids that “loneliness” by spending most of his time at the company’s Denver headquarters, and he welcomes the stability after so many years of far-flung travel. But, he said, he wouldn’t trade his international experiences for anything, and his global experience reinforces his belief that Mines has a key role to play in shaping the extractive industries of the future. “We’re going to have interactions with societies around the world, and the mining engineers of the future need to understand that role,” he said. “They need to be environmentally sensitive, and they need to be in coordination with local communities.”

Zisch recalls that when he was working in West Africa, he dealt with a very different type of government. “I hadn’t gotten any preparation for that at Mines. I got a very sound technical foundation, and that’s even more extensive for today’s undergraduates. But what’s going to distinguish the leaders of the industry is the ability to work with people around the world and understand the global context,” he said.

Some of those issues, Zisch adds, may not have cut-and-dried solutions. Although higher living standards around the globe translate into demand for raw materials, they also can lead to cultural and environmental friction. Zisch believes Mines is uniquely positioned to prepare students for those challenges. “When I went through school, they had just started to incorporate environmental design into the core curriculum,” Zisch says. “So my generation of graduates and subsequent generations understand the responsibility to be environmentally sound and socially friendly. It has come a long way since then, and it’s continuing to improve.”

In addition to the lessons he has learned in industry, Zisch gained perspective on the challenges facing today’s engineering students from his son, John, who is a recent Mines graduate (’09). While he understands the impact of adding environmental and social layers to an already-demanding scientific curriculum, Zisch has faith that Mines students are up to the task.

“I have a lot of confidence in Mines students,” he says. “Through all the years I’ve been associated with the university, I’ve always found a high quality of people. The industries that Mines serves are important to the nation and to the world. I know our students have the ability and the capacity to lead the extractive industries of the future.”

—Larry Borowsky

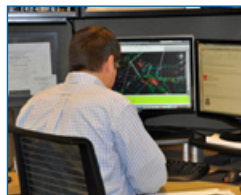
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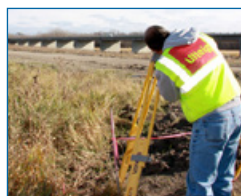
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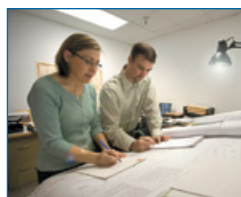
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 Julia Cleveland Krause  
 Quinn A. Larwood  
 Victoria K. Marques  
 Hilary N. (Stamp) McKenna  
 Jason M. Murray  
 Christopher D. Odom  
 Aaron J. Piper  
 Roscoe G. Rhoads  
 Marc Schiechl   
 David R. Schnabel  
 Tyler B. Smith  
 Lisa C. Truong

**2012**

James U. Ansley  
 Grace E. Bol  
 Clinton J. Campbell  
 Julia Davis   
 G. Hunter Dunham  
 Andrew W. Eilers

Connor M. Fiechtner  
 Sophie J. Hancock  
 Peter C. Harmon  
 Aaron J. Hart  
 Jacob A. Juett  
 Kyle P. Little  
 Chang Liu  
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 Penny L. Rogers  
 William D. Spaeth  
 Andrew J. Spencer  
 Ian F. Squier  
 Cassandra M. Stember  
 Nicholas L. Van Gundy  
 Grace E. (Bernard) Wilson



**2013**



Eric Anderson   
 Andriena-Marie Barendt  
 Kimberly A. (Combs) Black 

Thomas A. Blitz  
 Jeffrey M. Brosius  
 Jennifer E. Buechler  
 Juan C. Carratu  
 Hannah L. Cooling  
 Carlton L. Healy  
 Holly E. Hutchison  
 Detchai Ittharat  
 Rebecca L. Johnson  
 Evan M.C. Kias  
 Julie E. Leibold  
 Kyle C. Lindahl  
 Lindsey R. Margolies  
 Garrett E. McMath  
 Michaela L. McNiff  
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 Kyle A. Olcott  
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 Nadiah B. Rahmat  
 Aleksandr Reznik  
 Samuel A. Rogers  
 N. William Rommel  
 Lyndsey A. Schaefer  
 Eric A. Schuler  
 Joshua L. Shaw  
 Benjamin C. Skinner  
 Nicholas A. Waskewicz  
 Rachel M. Wiechman

Heather L. (Henkel) Wilson  
 Ryan A. Wood  
 Steven E. Wooldridge

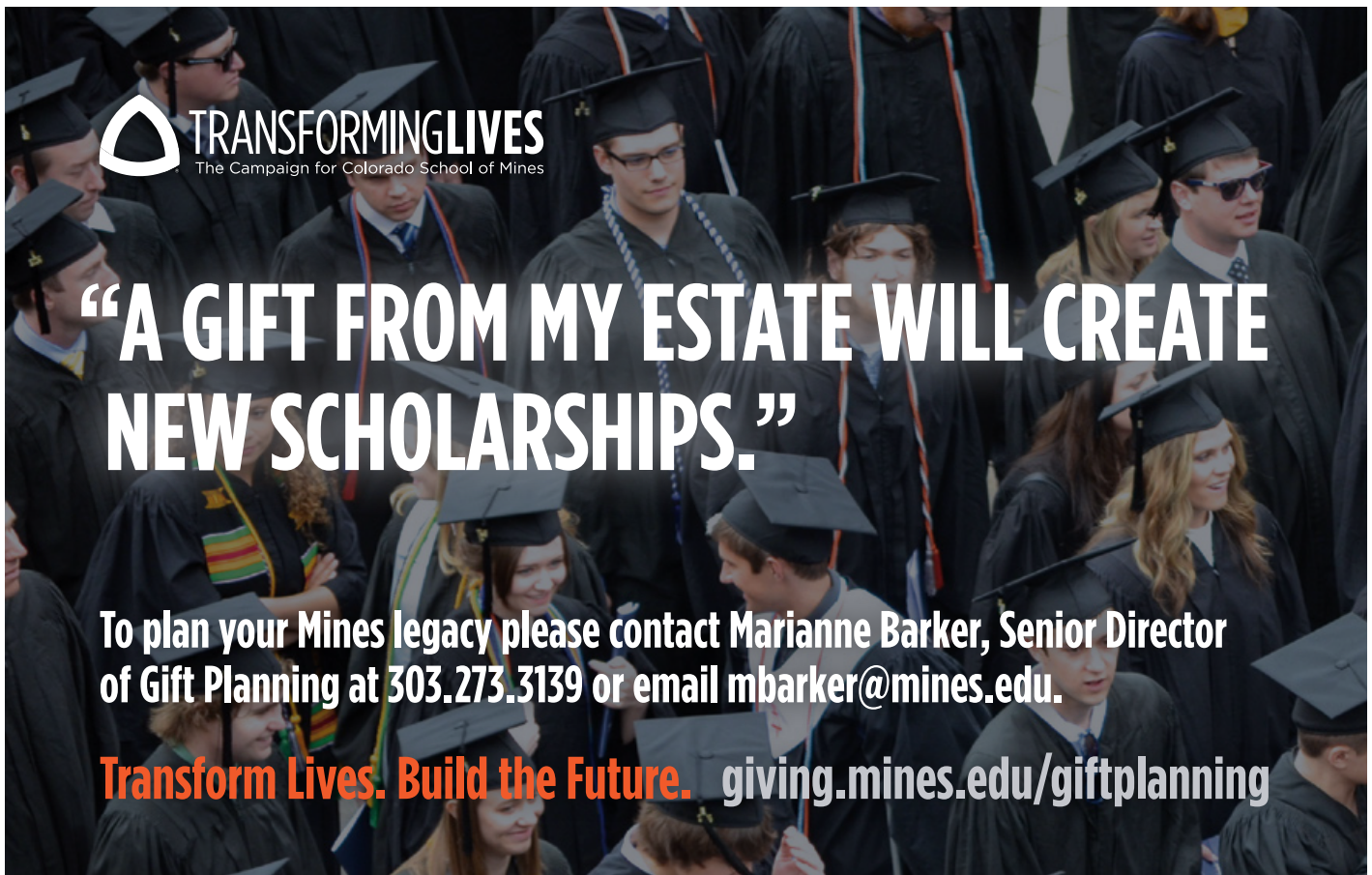
**2014**

Alhamid Alamin   
 Justin C. Bergman  
 Ryan P. Bott  
 Theodore E. Brandt  
 Justin D. Brewer  
 Ashley (Rowland) Brinkerhoff  
 David W. Broughton  
 Matthew M. Brown  
 Kevin Chan   
 M. Shawn Cole  
 Joshua M. Duffy  
 Elena M. Dutcher  
 Brianne M. Fagan  
 Blakley P. Farrow  
 Daniel J. Frank  
 Ryan C. Fulkerson  
 Sterritt R. Fuller IV  
 Israel Gomez  
 Travis A. Gowler  
 Caitlin E. Greagor  
 Brandon W. Hentges  
 Nicole J. Hughes

Christopher Eric Humphrey  
 Joseph S. Jennings  
 Alfredo Jurado Acosta  
 Claire M. Khalife  
 Mason C. Kreidler  
 Fabien Laugier   
 D. Justin Maham  
 Jared B. Mapes  
 Melinda E. (Bray) Marsh  
 John P. McMullen  
 John M. Meyer  
 Brendan N. Mori  
 Abel F. Najarro Saez  
 Stevie M. Newbill  
 Adebola A. Oyelakin  
 Carly I. Paige  
 Dongxu Peng 

Austin W. Pile  
 Eric T. Pogue  
 Joseph C. Purfield  
 Jeanell G. (Lee) Ries  
 Taylor R. Sallee  
 Wisnu M. Santoso   
 Derek B. Schissler  
 Peter M. Secor  
 Zulibukaer Shawuti  
 Jacqueline M. Stabell  
 Ryan A. Stewart  
 Charles Hayden Taylor  
 Emily E. (Hixon) Thompson  
 Susan V. Tran  
 Jay R. Wahlbrink  
 Eric J. Young

**ALUMNI:** What in the world are you doing? Send us your photos and a brief description of your activities (for instance, getting married, growing your family, traveling, meeting other alumni) to [magine@mines.edu](mailto:magine@mines.edu).



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# 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



**RICHARD F. BURCZYK** of Golden, Colo., died Dec. 10, 2014. Born in 1946, he graduated from St. Mary's College in Winona, Minn. and then received a master's degree in physics from

the University of Wyoming. After retiring in 2003 from a 29-year career at Coors Brewing Co., Dick became an adjunct instructor for the College of Engineering and Computational Sciences at Mines in 2005.

A U.S. Army veteran, Dick was active in the Rocky Mountain Down Syndrome Association, the Global Down Syndrome Foundation and the Developmental Disabilities Resource Center Players. An eagle scout, he also served on the Jefferson County Public Schools Capital Asset Advisory Committee.

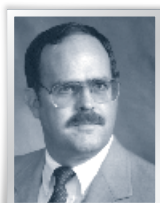
He was predeceased by his daughter, Ann Burczyk. He is survived by his wife, Laura; children, Jim, David, and Elizabeth Burczyk; and four grandchildren.



**ROBERT H. DOLL '56** of Bonita Springs, Fla., died Sept. 3, 2013. Born in 1934, in Casper, Wyo., he graduated from Mines with a professional degree in petroleum engineering.

As a student, he was a member of Sigma Alpha Epsilon fraternity and Theta Tau. He was an outstanding athlete and played varsity football for Mines for four years; Bob was also a member of the track team. After serving in the U.S. Army, Bob was employed for 29 years by Mobil Oil. He worked in Columbia, South America; Libya; Nigeria; Norway; New York City; and New Orleans.

He is survived by his wife of 49 years, Ann; children, Donald, Daniel, Pamela Duckworth, and Matthew; sister, Peggy Bogus; and five grandchildren.

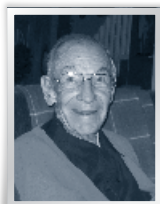


**RICHARD "RICH" D. DUNHAM '74** of Midland, Texas, died Feb. 13, 2014. Born in 1952, in Lamar, Colo., he received his bachelor's degree in chemical engineering at

Mines, where he was a member of Sigma Alpha Epsilon fraternity and Blue Key honor society. Rich began his career at Phillips Petroleum, and on international assignment in London, he met and later married Margaret Noakes in Ashington, Essex, England. After working for GPM Gas Corporation, Rich retired early from the oil and gas industry, earned his MBA from the University of Texas–Permian Basin, and started his own business, The Ashington Ltd. Co.

A life member of the Colorado School of Mines Alumni Association, Rich was involved in Rotary International and the Permian Basin Home Builders Association. He enjoyed being outside and running, with the goal of one day completing a marathon.

He is survived by his wife of 33 years, Margaret; mother, Lucy Dunham; children, Emily Dunham '06 and Christian; and brother, Chuck.



**MARVIN R. HEWITT '50** of Tulsa, Okla., died Feb. 9, 2014. Born in 1926, he served in the U.S. Navy for three years on Saipan in the Marianas Islands. The same year that he grad-

uated from Mines with a professional degree in geophysical engineering, he married Jene Baker.

Marv was a geophysicist with Amoco for his entire career, initially with the Pan American Petroleum Company (which merged with Standard Oil of Indiana to form Amoco), until he retired in 1987. The company transferred him multiple times, which included stints in Kansas,

Texas, Oklahoma, and Calgary, Alberta. He served as president of the Society of Exploration Geophysicists and was a member of the President's Council at Mines for more than a decade. In 2000, Marv and Jene took their entire family on a cruise to celebrate their 50th anniversary.

He is survived by his wife of 63 years, Jene; children, Dona Sherwood, Kay Dorris and Kim Saunders; five grandchildren and two great-grandchildren; and nephew, Richard L. Hewitt '82, MS '89 and '92, PhD '92.



**WARREN W. HILDEBRANDT '59** of Seal Beach, Calif., died May 14, 2014. Born in 1937, he graduated from Mines with a professional degree in geological engineering, and

as a student, was a member of Sigma Phi Epsilon fraternity. He began his career with Getty Oil Company and under their military leave policy, fulfilled his ROTC commitment to the U.S. Army Corps of Engineers then returned to Getty.

After his military service, he became a petroleum engineer and in 1973, was assigned to Los Angeles in Getty's international production division. One of his major accomplishments was as coordinator for a consortium of international companies that designed and built the Discoverer Seven Seas, a state-of-the-art deep-water drillship. After Getty merged with Texaco, Warren worked as a consultant for various companies throughout the rest of his career. He was a member of the Society of Petroleum Engineers and the American Petroleum Institute.

In recent years Warren served as Colorado School of Mines Alumni Association section coordinator for the Seal Beach/Los Angeles area, an E-Days host and Send-off event host. He was also a member of Mines Heritage Society.

A lover of Dixieland music, he began

playing the banjo at age 56 and cofounded the seven-piece Coyote Hills Jazz Band in 1995. Warren enjoyed camping, fishing, boating, and spending time at the beach. He coached youth basketball, T-ball, and baseball teams for many years.

He was predeceased by his son, Scott. He is survived by his wife of 54 years, Bonnie; children, Cari Hildebrandt and Todd; and one grandson.



**GILBERT T. INESS** '94 of Ocala, Fla., died Sept. 18, 2011. Born in 1969, he received his bachelor's degree in engineering, mechanical specialty, from Mines and was a member of Mines Little

Theater, and the Multicultural Engineering Program (MEP). His career took him to Trane, Shaw Industries, Behr Inc., and MotorGuide. An avid poker player, he progressed to the world series of poker, Las Vegas, in 2006. Gilbert enjoyed singing and karaoke and was a cartoon artist.

He was predeceased by his step-father, Don Merrill. His father, Charles Iness died in 2014. He is survived by his mother, Helen Merrill; his sisters, Debra Ward, Mitzi Pentycoft, and Natalie Blount; and two nieces.



**FREDERICK "RICK" D. JACKSON** MS '94 of Denver, Colo., died Oct. 6, 2014. Born in 1955, he received his master's degree in math from Mines and his bachelor's degree in math from

Metropolitan State University of Denver. He was a computer analyst for the Bureau of Reclamation from 1993 to 1997. From 1996 to 2010, he was president of his own company, Offline Inc. He had brief stints with General Dynamics C4 Systems, SW CM, Mphasis-US, NewGen Technologies Corp. as a software engineer, and Kaiser Permanente, where he was a senior web developer. He was a life member of the Colorado School of Mines Alumni Association.

Rick was predeceased by his parents, Fred and Ruth Jackson, and his sister, Mary. He is survived by his sisters, Sharon Jackson '94, Marj Lee, and Cynthia and Robert E. Crumb '61, MS '67; several nieces, including Rachel and David Stokowski '99, and nephews, including Nathan Ostrander '07.



**WILLIAM J. JOHNSTON** '51 of Houston, Texas, died Oct. 25, 2011. Born in 1929, in Lamar, Colo., he graduated from Mines with a professional degree in petroleum engineering. As a

student, he was a member of Alpha Tau Omega fraternity. After serving in the U.S. Army, Bill's career as a petroleum engineer spanned almost 60 years, and included employment at Humble Oil, Superior Oil and Bart De Laat and Associates. A history buff and bridge aficionado, he also enjoyed many years with the Hey Lollies Square Dancing Fellowship.

He is survived by his wife of 37 years, Sherry; sisters, Sylvia Bartay and Lizbeth Anderson; children, Catherine Roberts, William James, Ann Lauer, and Lynne Booth; six grandchildren and two great-grandchildren.



**ARTHUR J. KIDNAY** '56, DSc '68 of Arvada, Colo., died Jan. 6, 2015. Born in 1934, in Milwaukee, Wis., he graduated from Mines with a professional degree in petroleum refining engineering in

1956, followed by his doctorate in chemical engineering and petroleum refining in 1968. Art was professor emeritus of chemical engineering at Mines, served as a member of the Mines faculty for 21 years, and was head of the Department of Chemical Engineering and Petroleum Refining from 1982 to 1990. He was named dean of graduate studies and research in 1990. After his retirement from Mines in 1998, he continued to teach short courses for Special Programs and Continuing Education (SPACE). Art supported the university as a member of the President's Council for more than two decades. As a student at Mines, he was a member of the Tau Beta Pi honor society.

After graduating from Mines, he was an engineer for Monsanto Chemical Company and a research engineer for the National Bureau of Standards. He also received his master's degree in 1960 from the University of Colorado.

A fellow of the American Institute of Chemical Engineers, a member and former chairman of its Rocky Mountain section, and a member of Sigma Xi, Art's research interests included applied thermodynamics, vapor-liquid equilibria, and thermo-physical properties of fluids and mixtures. He built several vapor-liquid equilibria apparatuses at Mines.

In 2013 he received the Donald L. Katz Award from the Gas Processors

Association for accomplishments in gas processing research and engineering education. His name appeared in American Men of Science, now called the American Men and Women of Science, a biographical reference on leading scientists in the United States and Canada. He co-authored 70 publications, including three books. Appointed by the governor of Colorado, he served two terms on the Colorado State Board of Registration for Professional Engineers.

He is survived by his wife of 54 years, Joan; children Elizabeth Kidnay, Mary Morrow, and Brian; and six grandchildren.



**KARL LAMBERTSON** '49 of Grand Junction, Colo., died July 6, 2010. Born in 1923 in Aspen, Colo., he enlisted in the U.S. Army after high school, serving as a gunner in World War II. His plane

was shot down over Munster, Germany, in late 1944, and he was taken prisoner until the end of the war in 1945. Upon his return he attended Mines, graduating with a professional degree in mining engineering. His career was spent in the mining industry, including Union Carbide and Dow Chemical Co.

Karl is survived by his wife of 52 years, Winifred, and son Walter.



**JOHN CLIFTON "BUD" M. MCDANIELS** '50 of Grand Junction, Colo., died Feb. 12, 2014. Born in 1921, he joined the U.S. Marine Corps and served in World War II and Korea as a night

fighter pilot. On Christmas Day in 1946, he married Louise May, and four years later completed his professional degree in geological engineering at Mines. Bud was employed throughout his career with Chevron Geosciences Co. as a geological engineer in petroleum exploration. His work took him to Wyoming, Montana, Texas, and Perth, Australia. Bud was a member of the President's Council at Mines for many years as well as the Heritage Society.

He was predeceased by his wife, Louise, and five siblings. He is survived by his stepson, William Mills '59; siblings, Janet Barnes, Carolyn Scribner, and Beryl Brown; three grandchildren, nine great-grandchildren and three great-great-grandchildren.



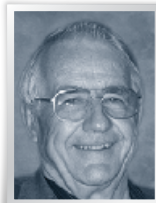


**WAYNE E. MCNEELY** '51 of Enid, Okla., died March 31, 2014. Born in 1925, he served in the U.S. Army during World War II from 1943 to 1946. After graduating from Mines with a professional degree

in petroleum engineering, he worked for more than 33 years as a production engineer and superintendent for Magnolia Petroleum Co., which became Mobil Oil Corp., retiring in 1984. He then worked as a petroleum engineering consultant in Nigeria and Brazil. In 1991, he and his wife, Elva Jean, began working summers in Yellowstone National Park, retiring in 2006. Wayne was a co-patentee of a down-hole logging technique, and he received many Mobil Oil Technical Recruiting Awards.

An avid photographer and coin collector, he was a member of several numismatic organizations. Wayne was a member of the American Petroleum Institute, the Society of Petroleum Engineers, and Mensa. He also was a member of the Heritage Society and the President's Council at Mines.

He is survived by his wife of 69 years, Elva; children, Virginia McCall, Sylvia Dymarkowski, Donald, and Hugh; siblings, Harold, Shirley Miller and Kittie Stricklett; eight grandchildren and 19 great-grandchildren.



**BRUCE M. MILES** '56 of Calgary, Alberta, died Oct. 18, 2013. Born in 1933 in High River, Alberta, he earned his professional degree from Mines as a petroleum engineer and then started

his career with Marathon Oil and Gas. He worked in the oil and gas investment banking department at the Bank of Montreal before establishing several of his own companies and joint ventures in Calgary: Heritage Resources, Northwood Oil Ltd., Elexco Surveys Ltd., and Ford Resources Ltd. As a student at Mines, he was a member of Sigma Phi Epsilon fraternity.

He is survived by his wife, Carol; children, Stephen, Michael, and Peter; brother, Graydon; and four grandchildren.



**FREDERICK A. PEEL** MS '72 of Arvada, Colo., died March 12, 2009. Born in 1938, he received his bachelor's degree in geology from Colorado College in 1961 and his master's degree in

geology from Mines. He worked as a mine

geologist for United Keno Hill Mines Ltd. in Elsa, Yukon; as a geologist for Hudson's Bay Oil and Gas Company in Calgary, Alberta; and as an independent consulting geologist in Calgary and Denver.

Fred spent four years in Angola as an exploration manager and a senior geologist. He returned in 1976, working as a senior geologist for CIG Exploration; general and exploration manager for Phelps Dodge Fuel Development; president and exploration manager for Summit Petroleum; and general manager, project manager, and geologist for Geochemical Engineering. From 1989 until his retirement, he was an independent consulting geologist. He enjoyed flying, spending time outdoors, and being involved with business endeavors in mining, petroleum, and environmental reclamation.

Fred's wife, Phyllis, died in 2014. He is survived by his daughters, Tricia Johnson and Marnie Eddy; and four grandchildren.



**THOMAS PHILOPOSE** of Rockville, Md., died Nov. 10, 2014. Born in 1931, he received his bachelor's and master's degrees from Presidency College—University of Madras and his PhD

from the University of Denver. He joined the Mines faculty in 1972 and became a professor emeritus of liberal arts and international studies in 1995. He was the first principal tutor of the McBride Honors Program, established in 1978. A visionary collaboration between Tom, Guy McBride, and Dendy Sloan, the program provided a new and unique focus on public affairs for engineers, continuing over the decades to inspire and motivate Mines students.

Tom was passionate about music, history, architecture, and learning. In his retirement, he shared that passion as a volunteer at the Kennedy Center, the Library of Congress, and the National Cathedral. He was a professional tour guide in the Washington, D.C., area and chaperoned two groups on tours of India in 2008 and 2011.

He is survived by his wife of 51 years, Vimala; daughter, Nalini Anand; and two granddaughters.



**DARRELL D. PORTER** MS '62 of Englewood, Colo., died July 24, 2013. Born in 1938, he attended Platteville School of Mines, which later became part of the University of Wisconsin in Platteville, where he received his bachelor's degree in mining engineering. After

receiving his master's degree in mining engineering from Mines, he worked for 17 years at DuPont, where he became one of the foremost explosive experts in the country and a holder of many patents. He also earned his PhD at the University of Minnesota. Following his time at DuPont, he worked for Amoco Oil on the original Rio Blanco Oil Shale project in Colorado, and for SAIC, where he retired in 2000 as senior scientist on the nuclear waste repository at Yucca Mountain in Las Vegas.

Darrell spent many hours volunteering at a Denver soup kitchen. He and his wife, Tanya, enjoyed traveling to Europe, Australia, New Zealand, Hawaii, and Alaska.

He is survived by his wife, Tanya; daughters, Sally Wright and Mary Green; stepchildren Wendy Armstrong and Robert Bradshaw; sister, Janice Davenport; and eight grandchildren.



**JOHN "JACK" A. REITZ** '53 of Pisgah Forest, N.C., died July 19, 2011.

Born in 1927, he enlisted in the U.S. Army during World War II, attended classes at Mines for a semester, worked at a mine in Honduras, and returned to Mines to earn his professional degree in mining engineering.

Jack spent his entire career with Ingersoll-Rand. After working in New Jersey and Oklahoma, Jack and his family moved to Costa Rica for eight years and then to Lebanon. They were evacuated from Beirut four years later, amidst bombing during the 1967 Six-Day War with Israel. They lived in Brazil for four years and then moved to Chile, where he experienced the 1973 military takeover of the country. He and his wife, Carol, spent the last eight years of his career in Venezuela. They retired in North Carolina.

Jack enjoyed painting, photography, listening to classical music, traveling, reading, collecting geological specimens, looking at classical cars, playing the flute, and fishing. He spoke three languages.

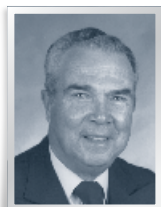
He is survived by his wife of 59 years, Carol; children, Stephen, Michael, Jennifer Groeneveld, and Tracy Stephenson; 10 grandchildren and two great-grandchildren.



**GLENN H. SIDES** '50 of Englewood, Colo., died Sept. 2, 2014. Born in 1921, he served in World War II as a marine in Okinawa and then received his professional degree in mining engineering from Mines. As a student, he was

a member of Alpha Tau Omega fraternity. After a 36-year career with U.S. Steel, he retired as superintendent of mines for the western division. Coal was a part of Glenn's entire life. He was born in a coal camp in Dora, Alabama by the light of a coal gas lamp.

He was predeceased by his wife, Bess, and is survived by his companion, Ruth Ann Fleming; children, John, Paul, Marilyn Sides, Elizabeth Pears, Lorraine Sides, and Catherine Sides; six grandchildren and seven great-grandchildren.



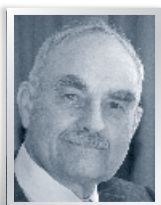
**DAVID E. SMINK '57** of Mountain Home, Ark., died Sept. 17, 2014. Born in 1935, he received his professional degree in petroleum engineering from Mines. Immediately thereafter,

he worked for 10 years as an engineer in various positions for Humble Oil (later Exxon) in Texas. He worked five years at Consolidated Oil and Gas before becoming an independent petroleum consultant in Colorado.

As a student, he was a member of Sigma Phi Epsilon fraternity, was on the honor roll three times, participated in ROTC, and was a recipient of the Sconoy Mobil-General Petroleum Co. Scholarship during his senior year.

A member of the President's Council at Mines, Dave was a registered professional engineer in six states, held several patents, and published several technical papers with the Society of Petroleum Engineers. His passions were fishing, hunting, and watching football.

He is survived by his companion, Betty Stanley; children, Tracey '83 and Glenn M. Vangolen '81, Stephanie Buchholtz, and Norman; brother, Carl; and one grandchild, Brent Vangolen '10.

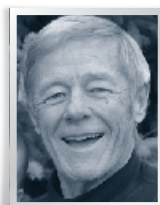


**STANLEY F. VERSAW '60** of Canon City, Colo., died Sept. 26, 2014. Born in 1938, he received his professional degree in geological engineering from Mines the same year he was commissioned into

the U.S. Army. He also received his master's degree in natural resources in 1988 from Colorado State University. After serving in the army, Stan worked for the USDA Forest Service for 28 years and another 2½ years for Davis Engineering Service in Colorado, owned by alumnus Paul B. Davis '39. At Mines, Stan ran track, played football, was a member of ROTC, and a member of Tau Beta Pi, Blue Key, and Sigma Gamma Epsilon honor societies.

Stan started a long family tradition of attending Mines, with his sons, Randy '83 and Todd '88, and nephews, Ronald Versaw '67, Aaron Nielsen '97 and Austin Elliott '14, following in his footsteps. His cousin's four daughters are all alumnae: Tawnya Chott '85, Teresa Muhic '85, Kathleen Thurston '88, and Tamara Muhic '82, who died in 2012.

He is survived by his wife of 54 years, Donna; children, Randall, Douglas, Todd, and Grant; siblings, Raymond, Dorothy Kirkpatrick, Ardell Versaw, and Lorene Byrd; 10 grandchildren and one great grandchild.



**RONALD F. WEISZMANN '64** of Seminole, Fla., died Dec. 19, 2013. Born in 1941, he received his professional degree in petroleum refining engineering from Mines and his law degree from University

of Denver in 1967. A member of the President's Council at the Colorado School of Mines, Ron was a patent attorney, tax attorney, real estate developer, banker, and travel agent.

As a student at Mines, he was a member of Sigma Phi Epsilon fraternity and played varsity football. In 1987, in honor of his parents, he established the Fred and Mary Weiszmann Endowed Scholarship Fund at Mines, which provides financial aid to student athletes from single-parent or parentless families. Ron enjoyed running 5K marathons, skiing, and traveling.

He is survived by his two daughters, Michelle Weiszmann and Erica Maciel; sister, Carol Kahler; and one grandson.



**ALAN "DOUG" D. ZUNKEL MS '65, DSc '67** of Vancouver, Wash., died April 9, 2014. Born in 1941, he received his bachelor's degree in metallurgical engineering from Missouri

School of Mines in 1964, and his master's and doctor of science degrees from Mines, where he was a member of Pi Kappa Alpha fraternity and served as the chapter president. He was also a member of Blue Key, Sigma Gamma Epsilon, and Tau Beta Pi honor societies. A captain in the U.S. Army who worked on NASA's Apollo lunar module, Doug worked and consulted for Fortune 500 companies, including Exxon, and many law firms nationwide. He established A.D. Zunkel Consultants Inc. in 1986.

He belonged to the Society of Mining Engineers, the Metallurgical Society (president in 1987), and the Canadian Institute of Mining and Metallurgy. A life member of the Philatelist Society, he served as a trustee of the American Institute of Mining, Metallurgical and Petroleum Engineers. Doug established the John P. Hager Undergraduate Scholarship Fund at Mines to support undergraduate students specializing in extractive metallurgy; he was also a member of Mines President's Council.

An Eagle Scout, Doug was a lifelong St. Louis Cardinals and Green Bay Packers fan, a golf enthusiast, a world traveler, a chef, and an expert on the genealogy of his family.

He is survived by his wife Olivia Ann; children, Lea Ann Zunkel and Ken; brother David; and one grandchild.

—Compiled and edited by Brad Dunevitz, Jo Marie Reeves, Laurie Schmidt, and Nancy Webb

## ALSO REMEMBERED

<b>CLIFTON H. BARNES, JR. '52</b> .....	January 12, 2011
<b>CHARLES R. BLOMBERG '39</b> .....	February 14, 2011
<b>ROGER E. BURCKERT '53</b> .....	September 27, 2010
<b>THOMAS CHYKO '65</b> .....	November 4, 1992
<b>ROBERT G. COUCH '36</b> .....	July 5, 2010
<b>GREGORY S. ERICKSON '86</b> .....	November 7, 2004
<b>RICHARD H. FULTON '50</b> .....	January 5, 2009
<b>THOMAS R. FULTON '53</b> .....	February 13, 2009
<b>KEITH G. GEORGE '59</b> .....	April 10, 2011
<b>ARTHUR J. HEISER '43</b> .....	April 7, 2011
<b>WILLIAM D. JACKSON '57</b> .....	April 18, 2011
<b>RICK A. JESCHKE MS '94</b> .....	July 12, 2013
<b>WILLIAM A. MAYS '42</b> .....	March 9, 2011
<b>FLOYD W. MOCK '51</b> .....	January 17, 2011
<b>JOSEPH A. NENNI '83</b> .....	August 10, 2014
<b>GERALD G. NICOLAYSEN, JR. '71</b> .....	March 15, 2005
<b>UNO NUMMELA '50</b> .....	October 16, 2010
<b>ARTHUR P. PIERCE '53</b> .....	January 21, 2011
<b>JANIS PRIEDITIS '81</b> .....	October 31, 2005
<b>LOUIS L. SCHER, IV '56</b> .....	May 30, 2010
<b>ZOILO TOLENTINE, JR. '47</b> .....	April 24, 2010

*Memorial gifts to the Colorado School of Mines Foundation are a meaningful way to honor the legacy of friends and colleagues while communicating your support to survivors. For more information, contact Melissa Carrera (303.273.3112 or mlcarrer@mines.edu) or visit giving.mines.edu/givingguide.*



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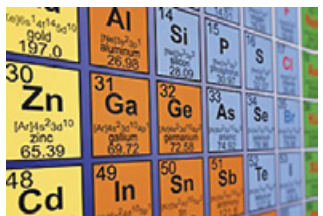
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# MINER'S PIC



Lear Miller and Vital MTB

## LIVIN' THE DREAM

Everyone talks about landing the dream job after graduation—Mines alumni Brandon Turman '08 and Courtney Steen '10, pictured above, actually made it happen. How do they spend their days now? Riding and testing the latest mountain bikes and components and relaying their on-trail experiences to the public.

"I have always had a passion for mountain biking, and when I came to Mines in 2004 it was a personal goal to share that passion with others by introducing them to the sport," said Turman. When the opportunity came up to manage the CSM Cycling Team, Turman says he jumped on it. In 2007, the CSM mountain bike team won the Collegiate National Championship. "Being a part of that success is

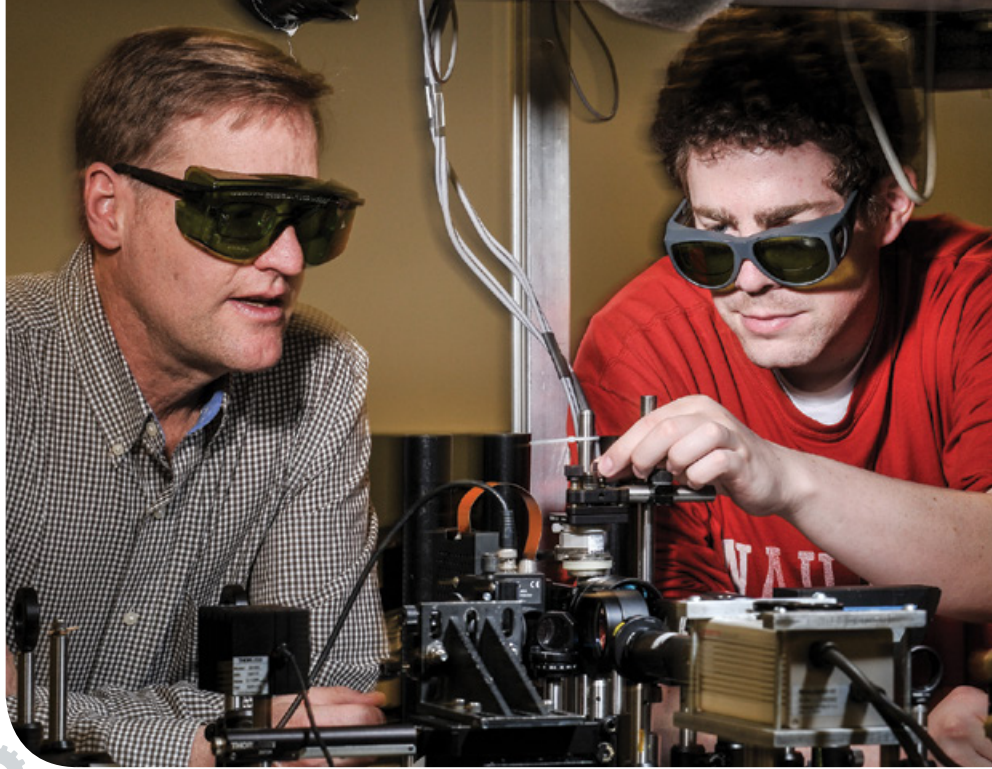
still one of the biggest competitive highlights of my time as a cyclist," he said.

Turman met Courtney Steen through the CSM team, and the two have been a couple ever since. In 2009, Courtney's skills landed her on the individual Collegiate National Championship Omnium podium.

Today, they live the mobile lifestyle while traveling to various mountain bike destinations around North America in search of the best trails.

"Our time at Mines and our engineering experience allow us to really dig into why bikes perform how they do," said Turman. "It's a fun job, and we love applying our technical backgrounds outdoors."





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