

MINES MAGAZINE

COLORADO SCHOOL OF MINES ALUMNI MAGAZINE



CALCULATING RISK

Many Mines alumni are putting their engineering skills to the test in a non-traditional way by entering the world of extreme sports. Several are even making a name for themselves along the way.

12

MINES SOLDIERS ON

As 2016 marks the 100th anniversary of Army ROTC programs in the United States, Mines demonstrates that while the world has changed, ROTC continues to build leaders both on and off of the battlefield.

16





Buffalo Battalion cadets prepare to board the Chinook Helicopter for a training exercise on the top of South Table Mountain.

Luke Brown

CONTENTS

Cover image: Mickey Wilson '11, MS '12 performs stunts on a 30-foot-high slackline during the Red Bull Airlines Competition, an event that combines slacklining and tricklining. (Photo by Alessandro Dealberto)

FEATURES



12

CALCULATING RISK

Several Mines alumni are making a name for themselves in the growing world of extreme sports and are redefining what it means to be an engineer.

MINES SOLDIERS ON

100 years after the establishment of Army ROTC programs in the United States, Mines' program remains a national stand-out and continues to foster leadership in both its students and alumni.

16

DEPARTMENTS

05 INBOX

06 INSIDE MINES

President's Corner | Athletics: RMAC All-Sports Cup | Peace Corps Prep Program | Faculty Profile | Drinking Water Safety | Just Published

22 LOOKING BACK

The Climb that Binds: the Famous 'M' Brings Mines Students Together

24 ALUMNI NETWORK

Mines in Motion | On Our Wall | Meet the CSMMA Board of Directors

28 ALUMNUS PROFILE

Joe Geiger '09

30 ALUMNI NEWS

34 IN MEMORIAM

36 AT YOUR SERVICE

38 MINER'S PIC

WEB EXTRAS | MULTIMEDIA

To view Web Extras, please visit minesmagazine.com

WALKING A FINE LINE

Watch a video Mickey Wilson '11, MS '12—along with other professional slackliners—walk along and perform stunts on a 480-foot-high, 360-foot-long line extending across the Mandalay Bay Resort and Casino in Las Vegas, Nevada.

BASE JUMPING FOR A GOOD CAUSE

Chris Fehn '12 says that one of his favorite BASE jumping events is the Turkey Boogie in Moab, Utah. Taking place over Thanksgiving every year, the Turkey Boogie is a fundraising event for Moab's local search and rescue team. Watch a video of Fehn BASE jumping at the 2014 event.

#MINESGEEK

This summer, many of Mines' social media followers participated in the #MinesGeek photo contest, submitting photos of what makes them a Mines geek. The winners received tickets to the President's Distinguished Lecture featuring Bill Nye during Homecoming. Check out the winning photos and all of Mines' geek pride on our website or by searching #MinesGeek on Twitter.

ANNUAL WHITEWASHING OF THE 'M'

Mines' Class of 2020 participated in the annual M Climb to add their freshly whitewashed rocks to the "M" on the side of Mt. Zion. If you missed it, check out photos of this year's events on our website.



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Robert J. Love '97
George Puls '75
Kenneth L. Spalding '60
Megan L. Woodul '10

2015-2016
Scholarship Recipients

Joseph E. Schneider

Senior, Mechanical Engineering
The Woodlands

Cody J. Huffmeister

Senior, Petroleum Engineering
Houston

Alanna M. Winfield

Junior, Mechanical Engineering
Houston

Jesse A. Baxter

Freshman, Undecided
Houston

Number of scholarships
granted: 31

Scholarship dollars
awarded to date: \$117,869

Endowment funds raised
to date: \$547,292

32nd Annual Golden Golf Tournament

Lunch Sponsor

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*A new scholarship is
being established. Stay
tuned for the 2016-17
scholarship recipients!*

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2015-2016
Scholarship Recipients

Jesse D. Turner

Freshman
Chemical and Biochemical
Engineering
Norman

Frederico R. Rosendo

Sophomore
Petroleum Engineering
Tulsa

Gregory M. Chapman

Sophomore
Metallurgical Engineering
Tulsa

Number of scholarships
granted to date: 9

Scholarship dollars
awarded to date:
\$48,000

Endowment funds raised
to date: \$164,170

2nd Annual Dallas Alumni Golf Tournament

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Rene R. St. Pierre '76

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2015-2016
Scholarship Recipients

Logan Braden

Freshman, Undecided, Keller

Rachel E. Becker

Senior, Geology, Coppell

Number of scholarships
granted to date: 2

Scholarship dollars awarded
to date: \$2,000

Endowment funds raised to
date: \$20,000





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Comments and suggestions are welcome. Contact us via our contact form at minesmagazine.com/contact-us/ or via mail at *Mines Magazine*, PO Box 1410, Golden, CO 80402. To update your address, go to minesalumni.com/update or email CSMAA@mines.edu.

INBOX

MINES PRIDE

I'm so proud of my school, I'm popping buttons! There are a bunch of stories in the summer issue of *Mines Magazine* that show what an outstanding faculty and student body we have. A team that places high in an aeronautics competition; a professor with a prestigious NSF CAREER Award; several articles on Mines' leadership in water research (so important); a great winter for both women's and men's athletic teams; our band in Dublin, no less. And a new, promising initiative for the future of the Alumni Association.

The school gets better and better. Well done!

Dennis E. Gregg '50

THOUGHTS ON MINING CLEAN-UP

I read with interest the article "Mining's New Legacy" in the spring 2016 issue of *Mines Magazine*. It is hard for me to understand what is "new." The initial conversation was the Gold King Mine blowout and how this is a wake-up call. One issue that was missing from this article was how Mines Men (referring to all graduates) have been involved with production from and clean-up efforts at this particular mine. This would not have been an issue if the government agency overseeing the work had involved Mines Men at the beginning of this latest effort. We just hope that this wake-up call makes them realize that they need to bring in the experts before they cause a problem.

Mines Magazine through the years has featured many miners who have been involved in clean-up efforts. The article highlighting the work that is being done by Jeff Graves '13 and Al Amundson '71 is just another example. Continue the good work in showing that Mines is the solution to the problem.

Bill Warfield '75



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PRESIDENT'S CORNER

2020 Vision

CONNECTING NEW OREDIGGERS TO MINES' TRADITION OF EXCELLENCE

The start of the fall semester is one of my favorite times of the year—in large part due to the new energy, ideas and personalities that each class brings to Mines.

First-year students experience a lot of “newness” in their first few months—new places, new expectations, new traditions, new challenges and a lot of new faces. All this newness can be both exciting and overwhelming.

I experienced this newness when I came to Mines last year. My goal for the first semester was to see and experience Mines as our new students see and experience it. I learned that students must be prepared for a healthy dose of hard work and academic rigor, to avoid flying solo, to get engaged in the Mines community, to explore new activities, and find ways to have fun and create balance in life. These seem to be the basic ingredients for success at Mines and beyond.

I also learned a lot from discussions with you, our alumni, during my first year. I often found myself wishing that I had recorded our conversations and could replay them to our students. Thus, one of our major efforts with the Mines Alumni Association this year is to explore ways to connect alumni and students to facilitate that exchange of advice and wisdom and pride in their connection to Mines.

I hope that many of you will participate. Having seen this in action already, I am confident that the examples, insight and pride you share will inspire our students and provide them with valuable tools for long-term success. For example, corporate CEOs and recruiters frequently tell me that one of the valuable and distinctive features of Mines graduates is their effectiveness in teams and tendency to be collaborative rather than competitive. Hearing that from you and receiving encouragement to get involved early and often, will lead our students to effective collaboration skills and ultimately, to succeed at Mines and after graduation.

When you become a Mines student, you join a very special and elite community. No one knows that and appreciates it better than our alumni. We hope that these new initiatives will enrich our alumni-student connections and lead to increased student success and further distinction of Mines graduates. I appreciate your participation and support for these efforts.

Go Orediggers!

Paul C. Johnson

ATHLETICS

Orediggers Aim High

There's no question that 2015-16 was the most successful year ever for Colorado School of Mines athletics. And the even better news? The best is yet to come.

In July 2016, Mines accepted the Rocky Mountain Athletic Conference All-Sports Competition Cup for only the second time in its history, recognizing the top overall athletic program in the Rocky Mountain Athletic Conference. Impressively, Mines scored more points in the cup standings (937 out of a possible 1,000) than any other team in the 24-year history of the competition. The win was the Orediggers' first RMAC All-Sports Cup since the 2011-12 season, and Mines has not finished lower than third place since, including a runner-up last year.

The RMAC All-Sports Cup was the capstone on an incredible year that included Mines' first team national championship (men's cross country), five RMAC regular-season championships, three RMAC tournament titles and bucketloads of individual honors.

"Mines had a monumental year, the best in school history."

- Director of Athletics David Hansburg

"Mines had a monumental year, the best in school history," said Director of Athletics David Hansburg. "It was just an outstanding effort by our coaches and student-athletes. It was really fun, and even the teams that didn't get the accolades have been rapidly improving."



Mines Athletic Director David Hansburg accepts the RMAC All-Sports Cup from Commissioner Chris Graham on July 9, 2016.

Most importantly, all that success came without losing sight of the ultimate goal for Oredigger student-athletes: their academics. Mines student-athletes notched a 3.139 cumulative grade point average in the 2015-16 school year, higher than the general student body's 3.092 average, and their graduation rate was 82 percent compared to 77 percent for non-athletes. Eleven Orediggers earned Academic All-America honors (an all-time high), while men's swimming, baseball, basketball, football, and women's outdoor track & field each won RMAC Brechler Awards for having the highest team GPA among their peers. Mines' five Brechler Awards were a league best.

"I'm so impressed by what our student-athletes do academically."

- Director of Athletics David Hansburg

"I'm so impressed by what our student-athletes do academically," Hansburg said. "They face academic challenges unlike any other school in NCAA Division II, and their dedication shows every day."

The 2016-17 season has the potential to be even better. Several Mines programs are in the midst of dynasties: women's soccer has won five straight RMAC crowns, and volleyball has won four, while others like women's basketball and men's indoor track & field are coming off their first-ever titles with young but experienced teams. And there are other success stories ready to be written, like a baseball program that had its best record ever in the spring of 2016 and a resurgent wrestling program that notched its best record since the 1960s. The best is indeed yet to come.



The Mines women's soccer team won the RMAC tournament championship, the fifth consecutive tournament cup since 2011.

Tim Flynn

For more on Mines athletics, visit minesathletics.com

by Tim Flynn

FACULTY PROFILE



ANGEL ABBUD-MADRID

DIRECTOR OF THE CENTER FOR SPACE RESOURCES

Angel Abbud-Madrid was born in Mexico in April 1961, the same month and year when Yuri Gagarin became the first human to venture into space. Eight years later, Abbud-Madrid's parents woke him up to watch the first manned spacecraft land on the Moon. It's no surprise then that from a very young age, he developed a fascination with space exploration.

After graduating with degrees in mechanical and electrical engineering from the Instituto Tecnológico y de Estudios Superiores de Monterrey (ITESM), Abbud-Madrid worked for a couple of years as a project engineer at a silver and gold mine in the Sierra mountains of northern Mexico. But he was still captivated with the cosmos. To continue his education and get involved in space-related projects, he moved to the U.S. in 1986, where he received his master's degree in aerospace engineering from Princeton University and his PhD from University of Colorado Boulder.

"From the very start of my graduate education, I was fortunate to work in truly exciting projects studying physical phenomena under low-gravity conditions in NASA's experimental facilities such as drop towers, parabolic flight airplanes and the space shuttle," Abbud-Madrid says.

In 1997, he participated as a member of the science operations team of combustion experiments flown on the STS-83 and STS-94 space shuttle missions. A year later, Abbud-Madrid jumped at the opportunity to participate on Mines' first space experiment onboard the Space Shuttle.

"That was the reason I came here," he says. "For five years, I was a co-investigator of the water-mist fire suppression experiment, which flew on the STS-107 mission of the space shuttle Columbia in 2003.

The success of this experiment earned Abbud-Madrid the NASA Astronaut's Personal Achievement Award, given for outstanding contributions to human spaceflight safety and mission success, as well as the NASA Group Achievement Award for his contribution as a scientist on the STS-107 mission. The results of this experiment eventually led him to work with NASA and private companies to design, test and launch the water-mist portable fire extinguishers, which are now part of the International Space Station.

Currently, he serves as the director of the Center for Space Resources at Mines. "We are working along with NASA, the commercial space sector and other universities in efforts to identify, excavate, extract, process and utilize resources from the Moon, Mars and asteroids, as well as to develop power, control and safety systems for human and robotic space missions," he says.



Angel Abbud-Madrid conducts an experiment in NASA's zero-gravity aircraft.

Photo courtesy of NASA

When invited to present at TEDxMileHigh at their **Make + Believe Event** in June 2016, he saw the lecture as an opportunity to reach a broader audience and share some ideas related to his research at Mines.

"I wanted to make the public aware of the availability and potential utilization of space resources to produce the fuel, materials and human consumables, which we currently launch from Earth at a very high cost," he explains. "This strategy will help us to 'live off the land' in space, reduce our dependence from terrestrial resources and increase the duration and reach of human and robotic space missions."

"This strategy will help us to 'live off the land' in space, reduce our dependence from terrestrial resources and increase the duration and reach of human and robotic space missions."

- Angel Abbud-Madrid

At Mines, Abbud-Madrid also teaches a course every fall on space exploration, serves as the Director of the Space and Planetary Science and Engineering Area of Special Interest, the Affiliate Director of the Colorado Space Grant Consortium and the faculty advisor of the Mines American Institute of Aeronautics and Astronautics student branch, the Astronomy Club and the Rocket Club. He acts as Mines' representative to the Universities Space Research Association, the Colorado Space Coalition and the Colorado Space Business Roundtable.

Outside of Mines, Abbud-Madrid is immersed in books and maps of all subjects, flies airplanes in the Colorado skies, and spends entire nights observing constellations, planets and stars. He is also the president of the Rocky Mountain Map Society and the Space Resources Roundtable.

Abbud-Madrid believes space exploration is humankind's next big step on scientific discovery and technological development and wants to see every discipline in STEM as a part of the effort.

"Given the interest of Mines students from all departments to get involved in the most exciting and innovative areas of engineering of their generation, coupled with Colorado having the second largest aerospace economy in the nation, it is easy to see Mines positioning itself to take advantage of this confluence of opportunities, both academically and in research," he says.

"With more than 140 years of expertise in terrestrial resources, I see Mines uniquely suited to lead the way on the next frontier of resource extraction and utilization. And that is up, in space."

by **Kathleen Morton**

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Patent Attorney, Associate
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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



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

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PREPARING ENGINEERS FOR GLOBAL SERVICE

Mines houses first Peace Corps prep program in Colorado

Mines was recently approved by the U.S. Peace Corps to house the first Peace Corps Prep program in Colorado. All Mines undergraduates now have the opportunity to prepare for adventures overseas, either as a Peace Corps volunteer or as a professional.

The Peace Corps Prep program aims to enhance students' undergraduate experience by preparing them for international development fieldwork and overseas service. Mines was selected for the pilot program based on the highly technical skills and knowledge of its graduates.

"There is a real synergy between Peace Corps and Mines, because they need trained, technical people," said David Frossard, a web administrator for Mines Computing, Communications and Information Technologies and one of the co-coordinators of the program.

The Peace Corps Prep program encourages students to expand their global awareness and gain international knowledge and skills that employers value, as well as develop leadership skills through volunteer work or internships. The program integrates coursework with hands-on experience and professional development, allowing students to gain sector-specific skills and foreign-language proficiency, while also cultivating a cultural competence that will help students succeed no matter where they are in the world.

Frossard, along with fellow co-coordinator, Juan Lucena, hopes students will be eager to be a part of the Peace Corp Prep program. "It just seemed to us that this would be a great opportunity to give our students," said Frossard. "For those who want to work abroad, who want to not just be a tourist but live in a place and become a part of a place, this is a fantastic experience."

The Peace Corps Prep program is a stepping stone for Mines students to put their engineering or science degrees to use in service of others after graduation. For more information about the Peace Corps Prep program, visit pcprep.mines.edu. If you are a Mines alumnus who served in the Peace Corps, we want to hear from you. Please contact Deirdre Keating at dkeating@mines.edu.

by **Ashley Spurgeon**



Courtesy of Peace Corps

In 2013, Peace Corps volunteers gathered with young Armenian women and counselors to participate in trainings, exercises and discussions on leadership, self-esteem, gender equality, trafficking, domestic violence, peer education and social networking.

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DRINKING WATER SAFETY

Study finds toxic chemicals in drinking water of 33 states

Mines professor Chris Higgins co-authored a study which found unsafe chemicals in the public drinking water of 33 states.

Courtesy of Mines

Unsafe levels of polyfluoroalkyl and perfluoroalkyl substances, industrial chemicals linked to potentially serious health problems, were found in the public drinking water of 33 states, according to a new study co-authored by Mines Civil and Environmental Engineering Associate Professor Chris Higgins.

The study, "Detection of Poly- and Perfluoroalkyl Substances (PFASs) in U.S. Drinking Water Linked to Industrial Sites, Military Fire Training Areas, and Wastewater Treatment Plants," was published August 9, 2016 in *Environmental Science & Technology Letters*. Higgins is one of 12 contributing researchers, with Xindi C. Hu, from Harvard T. H. Chan School of Public Health, as the lead author.

The researchers looked at concentrations of six types of PFASs in drinking water supplies, using data from more than 36,000 water samples collected nationwide by the U.S. Environmental Protection Agency from 2013-2015.

They also looked at industrial sites that manufacture or use PFASs; at military fire training sites and civilian airports where fire-fighting foam containing PFASs is used; and at wastewater treatment plants. Discharges from these plants—which are unable to remove PFASs from wastewater by standard treatment methods—could contaminate groundwater. So could the sludge that the plants generate and which is frequently used as fertilizer.

"It is a complex topic because these compounds stick around for a very long time in the environment and enter the environment in several ways. We are also exposed to them for a variety of sources."

- Chris Higgins

Higgins, who has been researching the effects of PFASs for more than a decade, said, "Poly- and perfluoroalkyl acids are highly fluorinated synthetic organic chemicals that do not occur in nature. Their highly-fluorinated tails repel both oil and water, which is why they are used in so many consumer products. These compounds are used as stain repellents, paper packing products and in making polymers like Teflon."

The study found that PFASs were detectable at the minimum reporting levels required by the EPA in 194 out of 4,864 water supplies in 33 states across the United States. Drinking water from 13 states accounted for 75 percent of the detections, including, in order of frequency of detection, California, New Jersey, North Carolina, Alabama, Florida, Pennsylvania, Ohio, New York, Georgia, Minnesota, Arizona, Massachusetts and Illinois.

"It is a complex topic," explained Higgins, "because these compounds stick around for a very long time in the environment and enter the environment in several ways. We are also exposed to them for a variety of sources."

Higgins continued, "They are extremely difficult to remove from water. At Mines we are working on a variety of water treatment technologies to treat these compounds. A great deal of work remains to be done."

by Deirdre O. Keating

JUST
PUBLISHED



MINERAL ECONOMICS AND POLICY

John E. Tilton, research professor in Economics and Business, and Juan Ignacio Guzmán draw on more than 50 years of collective teaching and research in the mineral economics field at Mines and the Catholic University of Chile in their book, *Mineral Economics and Policy*. The first part of the book employs microeconomic tools to analyze the behavior of mineral commodity demand, supply, prices and markets. The analysis is then used to assess policies confronting both mineral producing and consuming countries, with issues related to mining and economic development, the availability of nonrenewable resources, the environment and sustainable development, amongst others. (Routledge, 2016)

CALCULATING RISK

Mines Engineers are Making a Name for Themselves in the Growing World of Extreme Sports

by Lisa Marshall

Mickey Wilson '11, MS '12 performs at a Gibbon Slacklines event in Richmond, Virginia. Wilson is known to be one of the best in the world for highline tricklining.



Hayden Nickell

For Mickey Wilson '11, MS '12, it's just another day at the office.

Sporting baggy jeans, a black ball cap and an intensely focused look, the physics and metallurgical engineering graduate steps onto a 2-inch wide strap of webbing suspended a dizzying 460 feet above the blinking Las Vegas Strip. Guests at the nearby Mandalay Bay casino look up nervously as he moves toward the center, riding the line surfer-style and wildly rocking it back and forth. He briefly hops on one foot, then gracefully (and purposely) slips off, tumbling ground-ward. The audience gasps. His safety rope catches him. He climbs back up, grin spreading across his face. And he begins again, joining three other professional slackliners hired to put on tonight's hair-raising show.

What does any of this have to do with engineering? Let Wilson count the ways.

"Just setting up a slackline safely is an engineering problem," says Wilson, whose job has required him to tiptoe over an active volcano in Italy, traverse a cavernous limestone valley in Spain and perform high-flying acrobatics for the Prince of Dubai. "And what you do with your body up on that line—it's all physics."

Surprisingly, Wilson's career choice isn't as rare as you'd think. From Alan Stevens '12, an environmental engineering graduate turned professional musher; to Maureen Sweet '15, a chemical engineering graduate turned professional half-pipe snowboarder; to Derek Parks '05, MS '10, a computer scientist who moonlights as a wingsuit skydiving instructor, stories abound of Mines alumni using their engineering backgrounds to excel (even make a living) at extreme sports.

Some of these athletes say their appetite for adrenaline, and the epic kayaking, climbing and mountaineering around Golden, were some of the things that lured them to Mines.

Others say they gravitated toward their grueling, exceedingly risky pastimes as a mind-clearing distraction from the school's academic rigors. And many say the scientist's mindset is a perfect fit for sports in which calm, analytical problem-solving in tense times can mean the difference between life and death.

"Risk management was a big part of our curriculum at Mines," says Stevens. "Maybe it wasn't about jumping out of airplanes or trying to not freeze to death when you're out on the frozen ocean, but it translates well anyway."

FROM SUMMER ADVENTURE TO LIFE'S WORK

Alan Stevens knew little about Alaska and less about sled dogs when, after graduating, he spotted a job advertisement for “a poop scooper for 300 dogs.” He worked at a tourist dog-sledding camp, accessible only by helicopter, on Alaska’s Mendenhall Glacier. He assumed that by fall, he’d come home and get a “real” job.

“I thought of it as a big summer adventure,” he says. But during his time on the glacier, he became enamored with the athleticism of the huskies and the ancient form of transportation they provided to some of the world’s wildest places. By summer’s end, he set his sights on the frigid 1,000-mile Iditarod sled-dog race from Anchorage to Nome. He reached out to four-time champion Martin Buser for mentorship, began to amass a team of huskies and spent three cold and dark years training.

He used his engineering skills every step of the way, he says, from building himself a 31-pound carbon

fiber sled to designing tiny strain gauges (wired into each dog’s harness) to measure in real-time how much weight each was pulling. When it came time to packing and arranging for the drop-shipping of 2,700 pounds of supplies (mostly dog food) along the Iditarod Trail in March 2015, his eye for efficiency came in handy. His time management skills also helped, as he cared for 16 dogs, stopping for six-hour breaks to methodically examine each of their 64 feet, rub every shoulder, check every harness, melt snow and prep a warm stew for them and try to find time to feed and dry himself before packing up to go again.

At one point, he got lost and had to hunker down in -68 degree temperatures, blanketed in falling snow. At another, the team took 15 hours to scratch its way across the frozen ice of Norton Bay—visibility near zero. (It typically takes six hours.)

“When I was facing extreme diversity, I’d just stop, take a few minutes to think about what resources I had available to me and problem solve. I learned that at Mines,” says Stevens.

After 12 days, 8 hours, 43 minutes and 2 seconds, Stevens crossed the finish line, becoming only the 745th person ever to do so. By comparison, roughly 4,000 have summited Mount Everest. Now he’s back in money-making mode, offering tourist dog-sledding excursions to save up for his next race.

“There are always some eyes rolling during the tour when I tell people I am a trained engineer, and I admit my parents were extremely skeptical about the lifestyle I chose,” he says. “But when they saw me at the finish of the Iditarod, the scope of what we were trying to accomplish came into perspective. We are doing something big here. And it is a lifestyle that makes me happy.”

Hideo Sata



Alan Stevens approaches the finish line in Nome, Alaska, as he completes the 2015 Iditarod trail sled dog race.



Chris Fehn '12 BASE jumps into the New River Gorge in Fayetteville, West Virginia.

Courtesy of Chris Fehn

THE ZEN OF FREEFALLING

To computer science grad Derek Parks, who writes seismic data processing software for Landmark Graphics, the answer seemed obvious. In order to indulge his newfound and expensive hobby of skydiving, he'd have to get a second job. "I figured I'd pay for skydiving with skydiving," says Parks, who moonlights as an instructor with Longmont-based Mile High Sky Diving. That decision years ago led to a 300-jump-per-year habit, which in 2010 evolved into a new, even more esoteric hobby: competitive wingsuit flying.

"My first instructor told me: 'Being strong has worked for you in everything in your life, but you cannot be strong in the sky. You can't push against it,'" recalls Parks, a big, slick bald guy who played rugby in college. "You have to relax and learn how to control your body in a different environment."

Once he jumps out of a plane, his nylon superhero-esque wingsuit essentially turns his body into a plane, which he accelerates or brakes with carefully orchestrated movements. The rush is exhilarating, but the risk is real. "You are zipped into a suit, like a straitjacket, and you have to be able to unzip in time before you can reach back and control your parachute."

He also has, as he puts it, "geeked out" using his engineering skills to excel at his sport (which was only recently recognized by skydiving governing bodies as a legitimate discipline). He uses a GPS logger on his helmet to assess his precise location and glide ratio as he travels at 100-plus miles per hour. Then he plots that data on a graph, assessing it to improve his precision on future flights.

His most proud moment came in 2015, when he and 60 other wingsuit flyers set a world record for the largest formation made in the sky. The job of each flyer: to leap from one of five planes at

a precise time, then beeline toward their pre-destined position to join a giant human diamond. For less than a minute they stayed in place, two feet from each other, falling downward in synchronicity. Then, they peeled off and pulled their chutes. "You are working to get that one perfect frame—a perfect grid that everyone fits in," he says, proudly pointing to a photo of his blue suit at the center of the diamond. "It's almost a Zen experience."

"It is an extremely dangerous sport no matter how you do it, and you have to respect that."

- Chris Fehn

Chris Fehn '12 can relate. He found his way to skydiving, wingsuit flying and now BASE jumping after a 2010 motorcycle accident on his way to class landed him in the hospital for 45 days and required 13 surgeries to fix his leg. "I have had the urge to do risky things my whole life, but after the accident, I figured I am only going to do things that are really worth the risk," he says. "Motorcycling wasn't. BASE jumping is."

The mostly underground sport stands for Building, Antenna, Span and Earth—the four objects from which participants jump. Like skydiving, it requires a literal leap of faith, followed by a strategically timed parachute pull. But because Fehn jumps from 250 to 2,000 feet—rather than 13,500—there's far less room for error.

"It is an extremely dangerous sport no matter how you do it, and you have to respect that," says Fehn, who BASE jumps purely for a hobby. But the feeling of falling through the air with style, "It's just indescribable."



A GAP YEAR — OR TWO... OR THREE...

For recent graduates Maureen Sweet and Mickey Wilson, the thrill of extreme competition has been reward enough to forgo a lucrative job in their respective fields, at least for a few years.

Sweet came to Mines from Baltimore, in part to pursue a life as a competitive snowboarder—a goal that required her to drive to Summit County, Colorado five days a week before or after classes to train with her team. “You have to find some kind of extracurricular passion that you love or this school can eat you up,” she says. “The more stress school put on me, the more stress I relieved with snowboarding and the better I did at both.”

Now a professional halfpipe competitor, she says her mathematical mind is hard at work as she enters the pipe, plotting the angle she’ll have to move her body and the level of pressure she’ll have to put on the board to catch air. But as she soars above the 22-foot walls, doing tricks, her mind goes blank.

“I’m not focused on anything up there. It’s complete silence.” She’s now living in Aspen, Colorado, training to ride professionally with the 2017 U.S. Revolution Tour. Ultimately, she plans to go back to school for a nursing degree.

And for Wilson? The future is wonderfully uncertain.

Sitting in his kitchen in Golden, Colorado, surrounded by trophies from the Red Bull slacklining competitions he has won, he marvels at the fact that he’s able to make a living (albeit modest) doing the very thing his classmates gave him grief for back in school.

They always marveled at how the guy who was always hanging out, tan and shirtless, doing tricks on a slackline in the commons, managed to maintain a 4.0 grade point average. “I’d tell them, ‘for every hour of slacklining you do you get four hours of increased productivity,’” he says. “It clears your head.”

Now he’s a sponsored athlete, flying around Europe, the United Arab Emirates and South America to compete and put on shows for event companies.

“I spent a lot of my youth working really hard on academics,” he says, remembering the day post-graduation when he decided to stop looking for a “real job.” “I still wanted to save the world with solar energy, but I figured my 20s should be for athletics and my 30s could be more for serious stuff,” says Wilson.

“Right now, my life is more about experience than making money.”



Courtesy of Chris Fehn

Chris Fehn '12 jumps from the New River Gorge Bridge at Bridge Day 2014. Hundreds of BASE jumpers attend Bridge Day, one of the largest extreme sports events in the world.



Max Leszjak

With a 300-jump-per-year habit, Derek Parks '05, MS '10, had no problem donning his nylon wingsuit for a jump over Skydive Chicago this past August.



In October 2015, just before Red Bull Airlines' competition, Mickey Wilson '11, MS '12 was granted permission to stretch a slackline across one of Mount Etna's craters in Catania, Sicily. He had to deal with winds gusting as high as 100 mph, sharp volcanic rock and little information about the site ahead of time, putting his engineering skills to the test.

Mauro Puccini

MINES SOLDIERS ON

100 years after the establishment of ROTC,
Mines' program remains a national stand-out
by **Lisa Marshall**



Mines ROTC
members
present the
colors in 1925.

Prospector 1925

Sixteen miles into the 2016 Bataan Memorial Death March, Army ROTC Cadet Parker Bolstad felt his quads seize up, and he collapsed to his knees. He was clad in a full military uniform and boots, a 40-pound pack on his back. The blazing sun beat down on him, and the hot desert sand of New Mexico's White Sands Missile Range made the 80-degree day feel like 100. He was dehydrated and exhausted. But when a four-wheeler loaded with National Guardsmen drove up to pull him off the course, Bolstad instead filled his water bottle and kept running.

“It’s about showing yourself what you can do when you put your mind to it, and then helping others do the same.”

- Parker Bolstad

Ten miles later, he crossed the finish line at a time of 8:22:09, flanked by a crowd of cheering fellow cadets who had road-tripped from Mines to run either the 13.1-mile or 26.2-mile race in commemoration of World War II service members or cheer on their comrades from the sidelines. Inspired by the experience, Bolstad, a sophomore environmental engineering student, is now training other cadets for next year’s march. In a way, he says, it illustrates what ROTC is all about.

“It’s about showing yourself what you can do when you put your mind to it, and then helping others do the same,” says Bolstad. “It’s an incredible confidence builder.”

Established by Congress on June 3, 1916, the Reserve Officer Training Corps has for a century helped students like Bolstad earn degrees at top-tier civilian colleges and universities, while gaining resilience, discipline and leadership skills members say are not often emphasized in the traditional classroom. Awarding more than \$431 million annually, ROTC is among the nation’s largest grantors of scholarships. Students can earn a generous aid package in exchange for committing to military science classes and physical and combat training during school, as well as a four to eight year service commitment (either active duty or in the U.S. Army Reserve) post-graduation.

As one of the first four schools in the nation to establish an ROTC program, and, until the 1970s, one of the only to make ROTC mandatory for all students, Mines has been integral to the program since its inception, producing more Army officers (2,400 to date) and receiving more accolades than schools twice its size. As ROTC celebrates its centennial, alumni say the program is as relevant today as ever.

“If you look around at our major political parties, and Congress, and certain areas of industry, many would argue that there is a crisis of leadership in this country right now,” says ROTC alumnus Paul Dorr '74. “There is no better place to learn how to be a leader than ROTC.”



Air Force ROTC cadets stand in formation on the Veteran's Day Ceremony in November 2015. Front row: Andrew Blaney '16, Brandon Hall, John Boswell, Adam Nelson, Mary Bell. Row 2: Timothy Kelvin, Gary North, Timothy Cranor, Kristina Gately, Scott Kumjian. Row 3: Matthew Jaszai, Steven Mohan, Heidi Logsdon, Malek Awad. Row 4: Jason Loving, Chris Campbell, Luke Larocque, Justin Dollar.

Courtesy of Mines ROTC

“THE WEST POINT OF THE ROCKIES”

ROTC was officially established at Mines in 1919, under an authorization from the U.S. War Department. But the school’s close relationship with the U.S. military dates back to Mines’ inception.

As far back as 1873, students of what was then known as the “University Schools at Golden” could be found performing military exercises on campus under the leadership of decorated Civil War Captain George West. When Mines was officially founded one year later, the Military Department was among the first three departments established on campus.

“We have had Mines students in every war since 1874,” says ROTC University Liaison Fran Aguilar, as she tours a visitor through an office decorated with black and white photos and the retired, reddish battle flag of the 115th Engineers Regiment.

The precursor to Mines’ first ROTC Unit, the regiment was first established in 1909, making up one of the first engineering-

focused infantries in the country. By August 1918, the regiment touched down in France amid the battles of World War I, where members put their combination of engineering skills and military savvy to work constructing and repairing roads, bridges and camps near the front lines.

The following year, with World War I drawing to a close, and the U.S. military eager to be prepared for future conflicts, it established an official ROTC unit at Mines, expressly to train graduates for the U.S. Army Corps of Engineers.

In the decades to come, aspiring students would refer to Mines as “The West Point of the Rockies” and generals would call the school “The backbone of the Corps of Engineers.”

“Very early on, the military recognized that the Mines graduate was a unique graduate. Our students come out of school prepared to go to work,” says Dorr, now an ROTC board member who also co-authored a comprehensive history of Mines ROTC.



CPT Ryan Gibbons '09 and Hugh Evans '49, one of the last surviving members of the 10th Mountain Division, cut the ROTC's 100th birthday cake.

Agata Bogucka

A HERO HALL OF FAME

Survey the roster of the Buffalo Battalion ROTC Alumni Hall of Fame (which recognizes distinguished graduates), and you find tale after tale of wartime heroics by Mines ROTC alumni:

Wendell Fertig '24 famously refused to surrender to Japanese forces when they tried to occupy the island of Mindanao in the Philippines during World War II. Instead, he organized a successful U.S.-Filipino guerilla force, installed a civilian government and built a communications network there. After the war, he came to Mines to head up the ROTC program.

Keith Comstock '50 had already served on the India-Burma border during World War II and earned two bronze stars during the Korean War when he was commissioned to spearhead a top-secret CIA mission, Operation Gold, to build a quarter-mile tunnel on the border of East Berlin. According to press reports, the tunnel helped British intelligence officers tap into 1,200

phone lines, accessing 40,000 hours of conversations between the Soviet Union and East Germany during the early Cold War. Comstock wasn't permitted to discuss his work with anyone, including his wife and children, until it was declassified in 2007, 52 years after it was completed.

Hugh Evans '49 is one of the last surviving members of the U.S. Army's famous 10th Mountain Division which trained in the Colorado Rocky Mountains to fight on the snow-packed terrain of Eastern Europe. He was a platoon sergeant in Italy during World War II, returned to Mines to get a master's degree and join ROTC, then served again in the Korean War. At 92 years old, he still participates in a commemorative backcountry ski trip to his wartime training ground each year. When Mines was chosen to host a 100th anniversary celebration for ROTC in April 2016, he proudly cut the cake. "You can have a narrow life, or a deep and broad life," says Evans. "ROTC gave me depth."

THE VIETNAM ERA

Mines graduates' unique engineering skills continued to play a key role in the military theater during the Vietnam years. "You go into a triple-canopy jungle and there is no infrastructure. It has got to be built. Guess who built it. Our engineers," says Paul Dorr.

But as the war dragged on and anti-war sentiment peaked, ROTC began to fall on hard times.

Amid a wave of student and faculty protests over the U.S. military's involvement in the Vietnam War, Harvard University expelled ROTC from campus in 1968, prompting a host of other prestigious universities to follow suit. (Only recently has Harvard invited ROTC back to campus). At Mines, anti-war protests were less common, but a group of students did petition the state legislature to ask Mines to do away with its compulsory ROTC service. As a result, it was dropped in the early 1970s. After that, enrollment declined sharply from 768 members in 1968 to 387 members in 1974, before picking back up again slightly during the 1980s.

At one point, in 1991, the Army embarked on a plan to reduce the number of ROTC programs nationwide and pegged the Mines program for elimination, due to the school's small size and a perceived lack of demand. But Bruce Goetz, then professor of military science, personally fought to keep the program on campus. He succeeded.

"The tradition of the citizen soldier has always been revered at Mines," wrote Goetz, in the biography he presented for his recent induction into the Buffalo Battalion Hall of Fame. "There rests a quiet pride in the continuation of the tradition of military science here."

Today, Mines is part of a 13-member Buffalo Battalion, which includes University of Colorado Boulder, Metropolitan State University of Denver, and other Front Range schools. In both 2013 and 2015, the battalion earned the U.S. Army Cadet Command's MacArthur Award, recognizing it as one of the top eight programs in the nation.



A former ROTC cadet rappels down a rock face.

Courtesy of the Russell L. and Lyn Wood Mining History Archive, Arthur Lakes Library, Colorado School of Mines

BUILDING LEADERS, FROM BATTLEFIELD TO BOARD ROOM

Those who joined ROTC in more peaceful times also say their experience shaped their lives in invaluable ways.

Paul Dorr, a Steamboat, Colorado, native whose parents collectively made less than \$10,000 annually at the time, said ROTC's financial generosity made it possible for him to attend college. After graduating in 1974, he spent four years on active duty in Hanau, Germany, aiding in the construction of bridges, and then another 16 years in the Army Reserve. Meanwhile, he built an illustrious career as a strategic planner and entrepreneur in the mining industry.

He credits his private sector success largely to the lessons he learned in the military. He learned how to communicate concisely, not only with subordinates, but also with superiors and "those on your left and right." He also learned how important it is to take care of your employees. "I learned that you have to give people responsibility and training. But you also have to give them the authority to execute that responsibility. And then you have to hold them accountable for it," says Dorr. "That's true leadership, and too often it is not taught in business school."

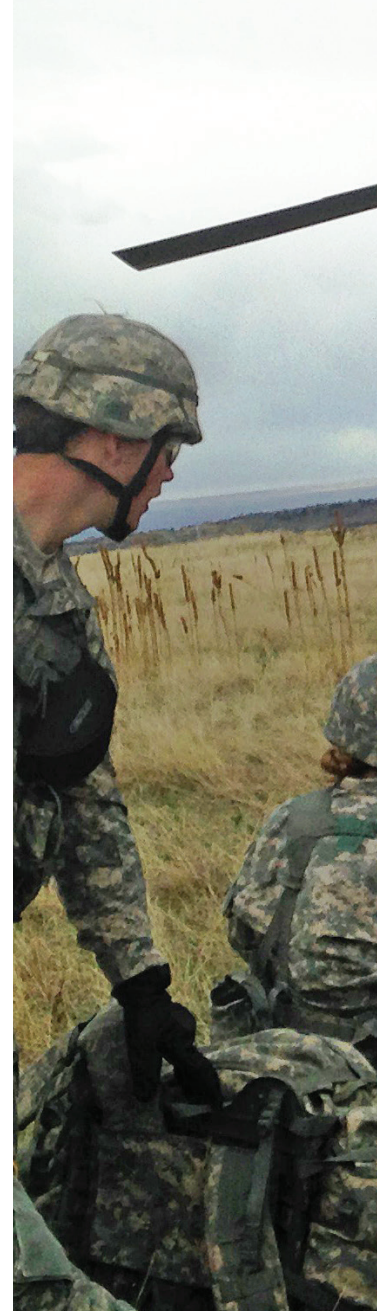
Janet Patev '86 says she was attracted to ROTC because, unlike West Point and other U.S. military academies, it allowed her to get a taste of the military culture without being fully immersed in it or having to pledge right away to a post-graduation commitment. (ROTC members aren't required to commit until their junior year).

"You could go to a [civilian] college and a few times a week put the uniform on. Most of the time, you felt like a regular student," says Patev, who spent four years active duty post-graduation. She now works in a civilian position for the U.S. Army Corps of Engineers. Herein lies another perk she got from ROTC.

"If you want to be hired for a federal position, being a veteran is a huge benefit," she says. "It helped me get my job."

ATTENTION ROTC ALUMNI

The Department of Military Science is building a database of former Mines ROTC students for the purpose of creating a wall commemorating alumni within the ROTC building. Please send a brief e-mail to faguilar@mines.edu listing your name, the year you graduated and/or were commissioned, and what military branch you commissioned in. We would enjoy knowing anything else about you, such as how long you served in the military and what you are doing now. If you happen to be in Golden, please feel welcome to stop by our office while you're in the area. The ROTC Cadre House is located at 1232 W. Campus Road in Golden.



Agata Bogucka

Spectators were able to get a close look at the Chinook, Apache and Blackhawk helicopters that landed on the Mines Intramural Fields during the ROTC 100th anniversary celebrations in April 2016.





ROTC TODAY

When it comes to physical training, today's Mines ROTC company is recognized as among the most physically fit in the nation. Members rise at 5 a.m. Four to five days a week for a rigorous workout (a perfect score on the physical training tests involves: 71 pushups in two minutes, 78 sit-ups in two minutes and a two mile run in 13 minutes or less.) Many climb, ski or run on the weekends, or—as Parker Bolstad did—crank their training up a notch by heading to competitions like the annual Bataan Memorial Death March.

Unlike cadets who came before them, ROTC members today aren't certain who the enemy is or where they will face them.

"Because the world is so chaotic, we tell the cadets they will deploy somewhere in the world, but we have no idea where," says Aaron Roof, the current professor of military science. "There is an emphasis on not what to think, but how to think—how to handle whatever complex task they are asked to deal with."

And those tasks aren't necessarily on the battlefield. In recent years, ROTC alumni have touched down in West Africa to help with the deadly Ebola outbreak, South Sudan to provide food to starving children and Haiti to aid earthquake survivors.

To John Kater, a mechanical engineering senior, ROTC has been a pleasant surprise.

Buffalo Battalion cadets prepare to board the Chinook Helicopter for a training exercise on the top of South Table Mountain.

Luke Brown

In high school, he envisioned himself as a theologian and saw the army and the ministry as diametrically opposed. "I envisioned myself cleaning toilets with a toothbrush like they did in the old war movies," says Kater, who changed his mind after attending an American Legion meeting. "I didn't realize ROTC could help me become a more competent leader and more impactful in my community."

Since arriving at Mines, Kater has gone to air-assault school in Georgia (where he learned how to rappel out of a helicopter), flown to Moldova (between Russia and Ukraine) for a language and cultural understanding program, and completed a grueling 16-day combat training camp at Fort Knox, Kentucky.

Now as a senior, he looks forward to leading new cadets to the program. Looking back, the former "wild child" as he describes himself, says it helped him become more disciplined and responsible and changed his image of the military.

"I went from thinking of it as a band of fighters to thinking of it as a band of peacekeepers," he says. "On occasion you have to fight to keep the peace."

THE CLIMB THAT BINDS

The Famous 'M' Brings Mines Students Together

THE M BY THE DATES

- 1908 — The M is created on the side of Mt. Zion
- 1920s — The M is highlighted with railroad flares for homecoming
- 1931 — Students light the M with electric bulbs
- 1932 — The M is permanently lit with electricity
- 1935 — The M is turned red for the Christmas holidays, a tradition that continues today
- 1948 — The M's lights are automated to turn off and on independently
- 1951 — The tradition of freshmen carrying rocks to add to the M begins
- 1989 — The M is modernized with new conduits, enclosed wiring and special multi-bulb terminals for easy color change
- 1998 — The M's circuit box is rewired to allow the three circuits of the M to be turned on in any arrangement and make changing color and designs easier
- 2003 — The M is computerized and a wireless controller is added allowing the lights to run coordinated lighting sequences
- 2008 — The M turns 100 and 11-watt incandescent bulbs are replaced with 2-watt LED bulbs for more brightness and energy efficiency.

SOURCE: Mines' Blue Key Honor Society

The "M" on the side of Mt. Zion was created in 1908 and has become a trademark of the Mines campus. This photo shows the M and Lariat Loop Trail Road around 1920.

Denver Public Library, Western History Photographic Collection

Ed May '65 had some unfinished business at Colorado School of Mines. It was a half century since he graduated, and something still nagged at him all these years later: not making the traditional climb to the M on Mt. Zion.

Just before his freshman class' M Climb back in 1961, May sprained an ankle while rock climbing in Clear Creek Canyon and couldn't make it up the mountain. So last fall, May made amends.

"I was writing up my life story for my family, and I realized I had a few loose ends," May says. "One of the loose ends was that there was no Ed May rock on the M. It makes sense that a 77-year-old alumnus wouldn't want such a blaring omission in his life—the M and the climb to it are entrenched in a rich history.

It's believed the M was born in 1908. The Golden Globe, the city's newspaper at the time, reported that about 20 faculty members and 250 seniors from the class of 1908—inspired by the U at the University of Utah and driven by a fellow student Herbert Everest's descriptive geometry problem of designing the M for his senior thesis—placed the 104 feet by 107 feet M on Mt. Zion on May 15, 1908, resting on a 23-degree slope.

Now, Mines' Blue Key Honor Society is charged with care for the M and the traditions surrounding it. Michelle Kozel, the program assistant for environmental health and safety and the society's faculty advisor, says most of the changes to the M over the decades have been related to making it more visible.

"Blue Key members did a lot of research for the M's 100th anniversary in 2008 and learned that students have been whitewashing the rocks of the M from the beginning," Kozel says.

But Mines wanted to do more than fill the M with white rocks. In the 1920s, students used railroad flares to highlight the M during homecoming. Then for homecoming in 1931, Blue Key members used a tractor to haul a generator, some poles, wire and bulbs up Mt. Zion to light the M. That went over so well, Blue Key started a fundraising campaign, hitting up alumni and Golden businesses for cash to light it permanently. In one year, they raised enough money to cover the cost, and in March 1932, the M began glowing at night with 25-watt bulbs.

In 1989, Blue Key modernized the lighting with upgraded wire and replaced the light sockets with weatherproof 11-watt bulbs. About nine years later, the M's circuit box was rewired so lights could be lit in varying arrangements, designs and colors.

The first renovations in the 21st century included computerized lighting with a wireless controller in 2003 that allowed for remote operation from the Mines campus. And in 2008, for the M's 100th anniversary, Blue Key replaced the incandescent lights with energy-efficient, two-watt LED bulbs.

Despite the technological additions to make the M more visible, carrying a rock up the mountain is still an important tradition at Mines. Kozel says freshmen began carrying rocks to add to the M in 1951. "That's when it was made part of freshman orientation as a way of unifying the freshman class and instilling them with school spirit," she says.

In a phrase, the tradition became the climb that binds all Mines students and alumni. That was one of the first lessons Mines President Paul C. Johnson learned when he arrived in 2015.

"I'd never seen anything quite like it," Johnson says, and has vowed to make the climb every fall. "It's their first big event as a community—a symbol of the start of their journey, and they know others have made the same journey. It's a neat and memorable tradition, and students can always share that experience with others who went to Mines. They all did the same climb and carried their rocks."

Fifty years after he was supposed to participate in the tradition, May admits he had some reservations about being able to make the climb, but says a few steps into the ascent, he knew he'd make it to the famed M. "I was literally swept up the hill by the enthusiasm of young, eager freshmen," May says. "The best part of it all was meeting the students. I was proud to be included in such a dynamic crowd of future engineers and business leaders."

May then adds this about the climb: "No matter what the obstacle, if you have the motivation, all things are possible. So my story of the climb is that once motivated, you can accomplish much in life—whether you're a young student embarking on life or an old curmudgeon lugging a rock up a mountain."

by **Doug McPherson**

Prospector

Thomas Cooper

Some traditions never change. Former and current students participate in the annual M Climb, which includes getting covered with whitewash.



MINES IN MOTION

Taking the Oredigger Spirit on the Road

What do mining industry trends, a world-class water engineering program, socio-cultural engineering challenges and a petroleum field session have in common? They are a sampling of the diverse research activities and programs happening at Mines, which, last spring, served as focal points for five special events held in cities around the country as part of the Mines in Motion series.

In addition to putting the spotlight on these particular topics, the series also took Mines on the road, bringing over 250 alumni, parents and friends together for campus updates, department news and a healthy dose of Oredigger spirit.

With M Club alumni leaders at the helm, Mines in Motion was a first step in helping to spark a renewed energy within our regional alumni networks. M Club leaders serve as ambassadors for Mines and liaisons with our alumni all over the world.

Currently, there are 54 different M Clubs around the world, from Brisbane to the San Francisco Bay Area, and just about every major city in between. Each M Club is overseen by at least one alumnus, and in most cases, a small committee of alumni, who plan and implement programs and events for local alumni throughout the year.

For Mines in Motion, these alumni leaders served as events hosts and emcees, playing a critical role in planning and promoting their respective events. Each featured city's venue offered an informal setting where guests could network, enjoy food and drink and

interact with faculty members and students about their projects. And, in the case of a few events, an enthusiastic, impromptu rendering of the Mines fight song capped off the occasion in true Oredigger fashion.

"Having the Mines in Motion visit in conjunction with our E-Days get-together made for a special event. The presence of faculty, student and administrative representatives from Golden provided a direct connection to Mines that was greatly appreciated by the alumni attendees," says Stafford Maheu '96, Albuquerque's M Club leader.

"These events are a great way to find out about what is going on at the school, meet alumni in the area we haven't met before and visit with the ones we've had at previous events. It is always so interesting to find out what other alumni have been up to," Portland M Club leader Karen Dennis '99 explains.

Taking this spirit on the road is a top priority in the year ahead. As we

look to enhance alumni engagement and offer more volunteer opportunities, the newly-launched M Clubs will enjoy heightened programming and resources, staff support, rebranding and increased marketing efforts and more support from the campus community. This year, Mines plans to visit M Clubs in Las Vegas, Philadelphia, San Francisco and Boston, with several more cities to be determined later this year.

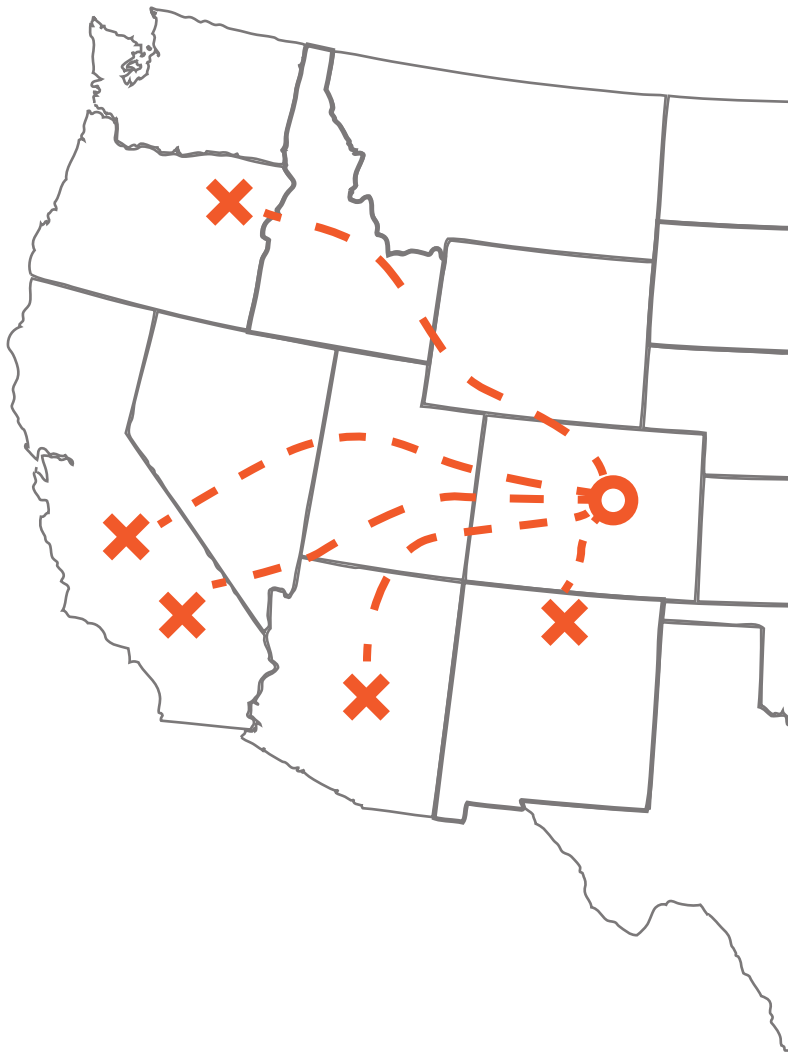
Watch www.minesalumni.com for details on upcoming M Club events in a city near you.

"These events are a great way to find out about what is going on at the school, meet alumni in the area we haven't met before and visit with the ones we've had at previous events. It is always so interesting to find out what other alumni have been up to."

- Karen Dennis



SPRING 2016 MINES IN MOTION DESTINATIONS



PHOENIX, AZ

February 20, Christopher's

Mines in Motion got rolling in Phoenix this year, in conjunction with the annual Society of Mining, Metallurgy and Exploration (SME) conference. Alumni and friends enjoyed a presentation by Priscilla Nelson, Mining Department chair, who shared the latest news from the department. In addition, student Erica West, a sophomore Harvey Scholar and Phoenix native, gave a colorful snapshot of her day-to-day Oredigger experience and her plans for the future.

SANTA FE, NM

April 3, Eldorado Hotel

A hearty group of alumni from both Santa Fe and Albuquerque gathered for a special Sunday brunch, which featured Terri Hogue, associate professor in the Civil and Environmental Engineering Department. Hogue was joined by senior Aspen Anderson, a ConocoPhillips Center for a Sustainable WE²ST scholar, who shared news on current environmental issues and what Mines is doing to address them. Guests also raised a glass in honor of E-Days 'Round the World, a favorite, long-standing Mines tradition.

PORTLAND, OR

April 20, BridgePort BrewPub

Alumnus and department head of Geology and Geological Engineering, Paul Santi '95 highlighted his research on socio-cultural needs and appropriate, affordable engineering solutions. This popular Portland pub was the perfect setting for younger and senior alumni alike to connect, reconnect and celebrate their Mines roots.

BAKERSFIELD, CA

May 21, Café Med

Held in conjunction with the Petroleum Engineering Department's annual field session, a spirited gathering at Café Med highlighted student stories and helpful (as well as humorous) words of wisdom from alumni. Special guests included President Paul C. Johnson and Mrs. Elyse Johnson, Mines Foundation President and CEO Brian Winkelbauer and Dean Ramona Graves and Linda Battalora from the College of Earth Resource Sciences and Engineering. "The students were genuinely interested in my reflections of life at Mines during the early 1980s and my rather random career tips," Dave Miner MS '83 explains. "I think these kinds of events help the students to visualize the spectrum of careers and experiences that they can expect as Mines graduates."

SAN DIEGO, CA

June 23, Stone Brewing World Bistro and Gardens

John McCray, Civil and Environmental Engineering Department Head, and senior Paige Becker, discussed their work with ReNUWit, the National Science Foundation's Engineering Research Center on Urban Water. Incoming freshmen and their parents enjoyed visiting with local alumni. An unrehearsed yet enthusiastic rendition of the Mines fight song, led by newly-appointed student body president, Mines Alumni Association board member and El Segundo, California resident, Jonathan Paz, brought the evening to a memorable close.

by Ruth Jones

ON OUR WALL

Not everyone has the guts for extreme sports, but what have you done that required extreme engineering?

During the drilling downturn of the 80s, I developed a welding technique that repaired tubing intended for a form of drill pipe that had been scrapped. As a result, my employer was able to produce for several years utilizing their scrap instead of purchasing the raw tubing.

I also developed a procedure allowing the first use of a weld-repaired, ground-based turbine rotor in the U.S. Failure could have resulted in loss of life, and making the program even more risky, the weld was found to have an internal "indication," which had to be evaluated and was accepted for use. The acceptance led to yearly highly calibrated non-destructive examination (ultrasonic) to verify no growth of the potential flaw. It also led to extensive time dependent creep fatigue analysis to verify the safety of the inspection interval.

Richard P. Wilson Jr. '76

Operating problems in a plate-fin exchanger with a vapor/liquid upflow pass were causing unstable operations. I hypothesized that the problem was hydraulic and developed an Excel-based CFD model to evaluate channeling of two-phase upflow through a single layer of the plate-fin exchanger. The model was developed to predict flow regime and to quantify required minimum flowrate and velocity to ensure liquid upflow throughout the layer in order to prevent channeling and liquid surge issues. The model was used as backup for negotiations with the exchanger manufacturer to design a unit with improved turnaround performance.

Barry Norman '79

Anyone who's been a parent knows the job requires extreme feats of creative engineering but is extremely gratifying.

Harold Cline '82

While working for Proterra, I developed a mathematical model to calculate the energy consumption, regeneration and heat loads for the various components of a hybrid bus. It helped that APTA had developed a course with speed, accelerations and distances spelled out for acceptable performance. I just had to model the physics for the course, plus some modifications for other applications. The model allowed the battery packs to be right-sized for the application and provided the basis for the cooling system.

Michael Fields '98

I use a little-known but highly effective electrical geophysical tool called Redox Mapping for metals exploration in extremely difficult environments, such as the Atacama Desert in northern Chile. It produces excellent exploration results to depths of 600 meters for epithermal gold and silver, copper porphyries, massive sulfides, replacement deposits and diatreme hosted deposits.

Jack Skokan PhD '75



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MEET THE ALUMNI ASSOCIATION BOARD OF DIRECTORS



TIMOTHY HADDON '70
Denver, Colo.
Board of Trustees Liason

Tim is currently the president and CEO of International Natural Resource Management Co. He graduated from Mines with a bachelor's degree in mining engineering in 1970 and has over 40 years of international mining and business experience. Tim has led public mining companies with operations in the Americas, Africa, Middle East and the Asia-Pacific region. He has worked extensively with environmental groups and project stakeholders around the world, encouraging open communication to

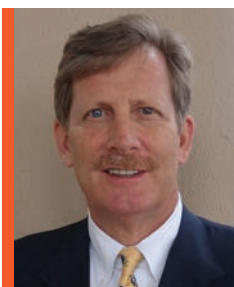
ensure all parties' concerns relating to sustainable mine and mine community development are understood and addressed. He is currently involved with companies operating mines in the U.S. and Canada. Tim is also a member of the Mines Board of Trustees.



DEAN LILEY '77
Denver, Colo.
Director

Dean was born and raised in Wheat Ridge, Colo., and is a native of Colorado except for a three-year period when he lived in Bakersfield, Calif., and he began his career. He received his bachelor's degree in petroleum engineering from Mines in 1977 and has spent his career working in the oil and gas industry. Dean is married to his high school sweetheart, has a son, a daughter and four grandchildren. Dean has an extensive background in financials, fundraising for non-profits and

a willingness to work on the behalf and for the benefit of others. He enjoys being a member of the Alumni Association Board and is honored to serve alumni in a capacity that benefits Mines graduates and the school.



BRADY MCCONATY '78
Houston, Texas
Secretary

Brady earned a bachelor's degree in petroleum engineering from Mines in 1978. While at Mines, he was president of Theta Tau fraternity and played football, lettering all four years and attaining All-Conference honors. Brady started his career working for Tenneco Oil Exploration and Production Company, serving in numerous disciplines, including offshore drilling, production and partner relations. He then started C2C Fiber Inc., in 1997, serving as president and CEO. In 2003, he founded Merrimac Oil

and Gas before joining Venoco Inc., in 2007 as vice president of Texas Operations and Business Development. Brady co-founded Tabula Rasa Energy, a CO2 EOR company in 2010 out of Midland, Texas, and is currently pursuing a new startup in the Permian Basin with his company Yankee Creek. Brady lives with his wife and two children in Houston, Texas.



JONATHAN PAZ
Golden, Colo.
Undergraduate Student Representative

Jonathan is a senior at Mines, pursuing a bachelor's degree in environmental engineering with a minor in economics. When he is not working on schoolwork, he partakes in many campus activities. He is the student body president, a peer mentor and founder of the current Mines Water Polo team. He is also a member of the Acts of Random Kindness Society, helping boost campus morale and empowering his peers by bringing people together.



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ALUMNUS PROFILE

Building a Future on
a ROTC Foundation

Joe Geiger '09 is not shy to say that being in ROTC as a student at Mines changed his life. His wife, Mel, agreed, remembering back to their high school days when he was a scrawny boy who had an afro of red hair and wore Hawaiian shirts like they were going out of style.

"I was able to get an engineering degree in four years and have a job and stay on track and have good grades and do ROTC because of the structure and discipline that ROTC provided. It's multilevel," Geiger said.

He knew he wanted to be in the military from a young age. Five generations of his family served in the U.S. Army, and he felt the calling, the desire, the responsibility to serve. He was awarded a National ROTC scholarship at the same time he was accepted to Mines—the only college he applied for. During his four years at Mines, he created lasting friendships with fellow cadets and ran up Mt. Zion too many times to count. Geiger graduated from Mines with a mining degree and went straight into the Army. He spent seven years in active duty, three years overseas and one year in combat in Afghanistan. His last day in the Army happened to be the day before he was interviewed for this story; his new reality was just setting in.

"I haven't processed [being out of the Army] yet. Even when I was on campus, we were doing physical training five days a week in the morning, and then we had classes and leadership lab, so I was in uniform almost every day. And then the last seven years as my full-time job," Geiger said.

But Geiger is not finished with the military. He accepted a job as an assistant professor of military science at the Rochester Institute of Technology. The position seems made for Geiger; it was vacant for four years because the requirements (a post-command captain with combat experience and an engineering degree) were pretty limiting. His Mines education made him the perfect candidate.

"Now I can kind of mold the little cadets into my vision of what a good officer should be. And I'm not the best officer—far from it. But I want to be able to take my slice of wisdom and try to make them better than I was," Geiger said.

As if his time in the Army and new teaching position do not show his commitment to service, Geiger also tossed his hat into

After 11 years in uniform (four years in ROTC and seven years as a U.S. Army captain), Joe Geiger '09 visited the ROTC building on the Mines campus in late June 2016. Now, he's shifting gears toward a career in teaching and politics.

Kathleen Morton

the race for a seat in New York's state legislature. Twenty-four candidates initially announced they wanted to run in the primary on the Republican ticket. Of those, 13 were invited to interview before party chairs in the district. Eleven candidates were then invited to participate in a caucus, and Geiger finished third.

"Third place as someone who had just moved home recently, had zero connections or background in politics and effectively hadn't been able to campaign at all [while serving in the military]," Geiger said. "The two people who beat me had been involved in politics and government for 20 years plus and they were already elected officials as it was. It was kind of a shocker."

Now that he has the freedom to campaign, Geiger thinks he has as good of a shot as anyone to make the ticket for the primary in September and believes that because of the conservative demographics of the district, whoever wins the Republican primary will go on to win the election in November. He will campaign on three specific platforms: rooting out government corruption, fixing a crumbling infrastructure and growing a friendly business climate. He was also recently accepted to the University of Rochester's Simon Business School, where regardless of whether he wins the election, he will go on to get an MBA.

Geiger's life has been full of learning opportunities that he hopes will help make a difference and contribute to bettering the world. And even though he says it's cheesy, Mines was instrumental in his success.

"I would say joining the Army was the second best decision I've made. The best decision was marrying Mel, and I'm really excited that we have a baby on the way," Geiger said. "Our journey started years ago with me joining ROTC."

by **Anica Wong**



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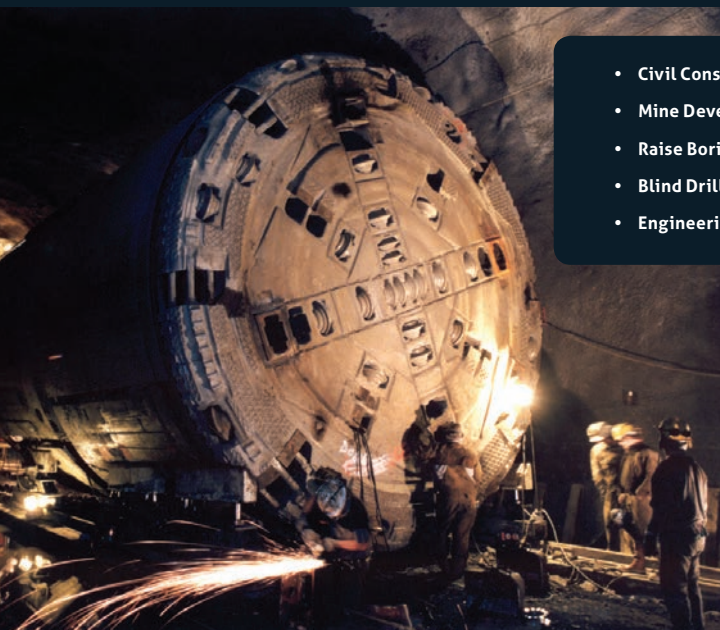
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WEDDINGS



WEDDED BLISS

Thomas Bonnie '04, MS '07 and Stephanie Jungmeyer were married on May 23, 2015, in Overland Park, Kans. Mines alumni in attendance included Adam McCormick '07, MS '07 (groomsman) and Christine (Brady) Woods-McCormick '07. Emeritus professors Eul-Soo Pang and Laura Pang also attended, along with retired Liberal Arts and International Studies staff member Connie Warren.



BEACH WEDDING

Christina Volpi '12 and Travis Pitcher '12, MS '15 had a beautiful beach wedding on May 28, 2016, in Del Mar, Calif. They celebrated with their friends and family, including fellow Mines graduates. Pictured in the photo from left to right are: Ben Andrews '16, Matthew White '15 (best man), Christina Volpi '12 (bride), Travis Pitcher '12, MS '15 (groom), Kimberly Reggish '13 (mother of the groom), Steven Rand '15, Hannah Rand '12 and Kirsten Volpi (mother of the bride; Mines Executive VP, COO, CFO and Treasurer).



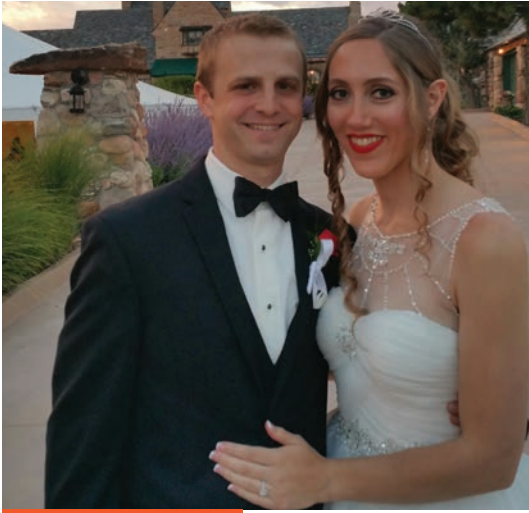
AN OREDIGGER PARTY

Maria Monroe '15 and Corbin Smith '15 were married on June 3, 2016, at The Chateaux at Fox Meadows in Broomfield, Colo. Maria and Corbin met as students at Mines. Over 50 Mines students and alumni attended the wedding, including Carson Sharpless (groomsman), Umberto Kilbarger '12 (groomsman), Andrea Trompak (bridesmaid) and Tabitha Kalin (bridesmaid).



LONG DISTANCE TO LONG TERM

Stefan Manning '14 married Angela Boroden on Feb. 13, 2016, in Atlanta, Ga. The couple met online during Stefan's senior year at Mines. Angela lived in Atlanta, Ga., but the couple visited each other during school breaks. Mines alumni in attendance included Clayton Manning '14, MS '15 (best man), Alex Gonzalez '14 and Jared Loving '14.



ENGINEERS IN LOVE

Karen Moll '13 and James Gayer '13, MS '15 were married on Aug. 12, 2016, at Cherokee Castle in Sedalia, Colo. The couple met during their freshman year at Mines and both completed their bachelor's degree in geophysical engineering. Many Mines alumni attended the wedding, and Karen paid tribute to her alma mater with her Mines class ring as her "something blue." Karen currently works at Lockheed Martin and James works for Sierra Nevada Corporation.



LOVE ON A MOUNTAINTOP

Jamie Jackson '04 married Sean Hansen on July 1, 2016, in Denver, Colo. The couple met through a mutual friend through law school. Both sharing a love for the outdoors, Sean proposed on a mountain in Rocky Mountain National Park during a backcountry ski trip.



A DECADE AND BEYOND

Kyle Wallace '13 married Kelsi Waite '13 on April 16, 2016, in Boulder, Colo. The couple got married on their 10-year anniversary after dating since their freshman year of high school. Michael Fuller '12 served as the best man.



HITCHED DOWN IN MEXICO

Ryan Phillips '13 married Gretchen Wright '13 on March 4, 2016, in Puerto Aventuras, Mexico. The couple met as students at Mines. The wedding ceremony was officiated by Reverend Nicholas Shipman '12, and Brennan Kimura '12 and Abby Smeltzer's '16 son, Brian, served as ring bearer. Other Mines alumni in attendance included Chris Enger '12, Gerardo Fraustro '12, Fellipe Amaral '13, Andy Wynes '16 and Aimee Anderson '16.

BABIES



NEW FAMILY OF FOUR

Jon Charzynski MS '10 and Kasia (Monika) Charzynski MS '09 welcomed their second son, Oliver, into their family on March 12, 2016. Oliver joins his big brother Julian.



WELCOMING ANOTHER BOY

Sabu Watanabe III '08 and Rachael (Cisneros) Watanabe '08 welcomed a new baby boy to their family. Tadashi arrived on June 8, 2016, joining his three-year-old big brother, Sabu Mataeo Watanabe IV. Tadashi's photo was taken by Emilyanne (Dalton) Hardy '10.



AN OREDIGGER IN THE MAKING

Eric Tidd '01 and Ashleigh Tidd are the proud parents of their first child, Nora Belle, who was born on Jan. 12, 2016.



SISTERS FOR LIFE

On May 26, 2016, Luis Agapito MS '08 and Roxana Torres welcomed their daughter, Maria Fe, into their family. Maria Fe joins her four-year-old big sister, Camila.

In Other

NEWS



BACK ON THE COURT

The 1981 Mines men's basketball team recently celebrated their 35th reunion, visiting Mines this summer to once again play on the court together. They were hosted by Pryor Orser, the Mines men's basketball head coach, who spent the morning with the team and made them feel at home again. Front row: Coach Orser (standing), Eric Dupont '84, Dick Castle '84, Kelly McCarthy '85, Bert Fleck '82, MS '84, Paul Anderson '85, Paul Groven '81 and Dave Scheidegger '83. Back Row: George Wayne '85, MS '92, Peter Koclanes '84, Tim Hermann '82, Jeff Rhodes '82, Bob Netzel '84, Darrell Miller '83, Doug Genty '81 and Greg Larrabee '82. Not in attendance: Paul Trousil '84.



CYCLING REUNION

In celebration of the 41st anniversary of their graduation, six members of the class of 1975 and the Sigma Alpha Epsilon fraternity bicycled 350 miles on the Great Allegheny Passage and Chesapeake and Ohio Canal towpath from Pittsburgh, Pa., to Washington D.C., on April 24-30, 2016. Pictured left to right are: Steve Lambert '75, Matt Thiel '75, Jim Waugaman '75, Mark Foxwell '75, Steve Anderson '75 and Jim Perry '75.

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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



THEODORE C. “TED” BILLS '81 died in April 2015. He was born in 1956 and graduated from Mines in 1981 with a degree in mining engineering. As a student at Mines, Ted was a member of Alpha Tau Omega fraternity, twice serving as its president, and was also a member of Theta Tau Engineering Honorary Society. Ted built a 20-year career in underground construction, before retiring

to Oklahoma in 2002. After the funeral service, a bench was memorialized in Ted's name on the Mines campus. Several Mines alumni attended the service including, Ron Bills '69, Jim Bills '72, Brian Lawrence '69, John Bills '01, Steve Onorofskie '70, MS '71, Emil Jahna, Dave Ostrander '82 and John Craig '81.



DONALD F. MEALY died May 30, 2016. He was born in Troy, N.Y., in 1925. He received a bachelor's degree from Union College and completed graduate studies at Columbia University. Donald served as a naval officer in the South Pacific during World War II and continued his service as a lieutenant in the U.S. Navy Reserve and was an instructor at the Troy Naval Reserve Armory. He moved

to Golden, Colo., in the 1950s and taught English at Mines from 1951-1956. Donald then moved to California where he worked for Northrop Aerospace Systems and taught night school at West Coast University. He retired from Northrop after 25 years but, continued teaching English at Bishop Montgomery High School for several years.



ALVA M. CASTER '60 died March 15, 2015. Born in 1931 in Oberlin, Kan., Alva attended the University of Kansas as a Summerfield Scholar. He received a degree in petroleum engineering from Mines in 1960. He spent 35 years working as an engineer in the petrochemical industry which took him to places such as Saudi Arabia, India, France and all around the United States. Alva also

served in the U.S. Army during the Korean War.



PAUL D. OGG died July 6, 2016. He earned a bachelor's degree in psychology from Albion College and a PhD in molecular biology from the University of Iowa. Paul taught at Mines as a teaching associate professor of chemical and biological engineering after joining the school in 2006 as part of the Bioengineering and Life

Sciences (BELS) program and was part of the teaching faculty that joined what was then the Chemical Engineering Department in 2007 after BELS dissolved. At Mines, Paul helped lead the creation of the "Introduction to Brewing Science" course and the building of a malting system in the Unit Operations Building behind Alderson Hall. He was even pushing for a master brewer program at Mines. Paul was a partner in Declaration Brewing, where he also held the titles of yeast farmer, quality control officer and tasting panel steward and was influential in the Denver brewing scene.



LAURENCE H. “LARRY” GARDNER II '53 died Feb. 10, 2016. Born in Buffalo, N.Y., in 1929, Larry graduated from Mines in 1953 with a professional geological engineering degree. He served as an officer in the U.S. Army Corps of Engineers in Korea and Japan and received the United Nations Service and Korean Service medals. After his military service, Larry worked as an exploration

petroleum geologist with Texaco and later as a groundwater geologist for the Virginia Division of Geology and Mineral Resources. Later in his career, he attained his Chartered Life Underwriter designation and worked as an insurance agent for Southwestern Life Insurance Company.



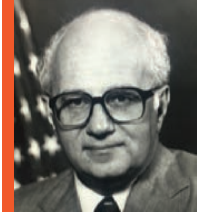
PATRICIA C. PETTY died April 10, 2015. Born in 1927, Patricia worked closely with Mines and the Mines Alumni Association, becoming an honorary member in 1983. Patricia also served as the placement director and the advertising salesperson of the alumni association. She then was appointed editor of *Mines Magazine* from 1980-1988. After her run as editor, Patricia

worked at the International Institute at Mines. In 1988, she was named Colorado Press Woman's Woman of Achievement and was appointed by Robert Murray to president of the Society of Mining Engineering (AIME). Patricia was also a member of the Mines President's Council.



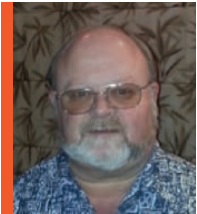
ROBERT L. “BOB” KERWIN '53 died June 16, 2016. Born in Denver, Colo., in 1931, Bob graduated from Mines in 1953 with a degree in metallurgical engineering. As a student at Mines, Bob was a member of ROTC and Sigma Alpha Epsilon fraternity. He served in the U.S. Naval Reserve from 1949-1951 and was an officer in the U.S. Army from 1954-1956. He began his engineering

career at Caterpillar Inc., and joined Earle M. Jorgensen Co. in 1959. Bob joined Atlas Foundry Company in 1978 as manager of quality assurance and was eventually promoted to technical director, a position he held until his retirement in 1989. Bob was a registered professional engineer in Oklahoma and Washington.



FRANCIS W. "FRANK" WOLEK '57 died July 22, 2016. Frank was born in Brooklyn, N.Y., in 1935. He received a degree in geological engineering from Mines in 1957 and went on to earn an MBA and DBA from Harvard Business School. Frank was an Eagle Scout with the Boy Scouts of America and was an assistant professor of industry at the Wharton School of the University of

Pennsylvania. He also served as Deputy Director of Commerce during the Carter Administration. Following his government service, Frank taught at the Villanova School of Business for over 19 years. He retired as a professor emeritus from Villanova University.



MICHAEL B. "MIKE" SAWYER MS '80 died August 12, 2016. He was born in 1950 in Providence, R.I., and graduated from Mines with a bachelor's degree in geology from Bates College in Lewiston, Maine, and went on to complete his master's degree in geology at Mines in 1980. Mike lived in Colorado since 1972 and worked for the U.S. Geological Survey and the U.S. Bureau of

Mines. He retired from the U.S. Bureau of Land Management in 2005.



ANTHONY "TONY" MEYERS '79 died on June 17, 2016, in Sunrise, Fla. He was born on March 27, 1957, in Sioux Falls, S.D. He graduated from Glenwood Springs High School in 1975. Tony received his bachelor's degree in mining from Mines in 1979. Upon graduation, Tony received an award for the most improved grade point average over this four years at Mines. He worked for North American Coal Corporation for over 25 years

and was vice-president with CEMEX in South Florida. His family remembers his love for fishing and golfing.

ALSO REMEMBERED

Eric A. Bayley '70	December 17, 2014
Robert Bernstein '42	December 14, 2014
Peter B. Bike '50	January 17, 2015
James M. Borer PhD '05	July 4, 2015
Willem J. Botha MS '78, PhD '80	May 24, 2014
Kenneth W. Bott '67	September 21, 2015
James L. Bowen '43	October 9, 2014
Robert H. Chase '55	May 1, 2015
Donald L. Coulthard '58	December 11, 2014
Frank C. Davis Jr. '48	July 5, 2015
Bill F. Dittman '49	March 11, 2015
Richard A. Erickson '74, MS '77	June 6, 2015
George M. Fairer '71	September 30, 2014
Raymond B. Franklin '49	January 11, 2015
Andrew D. Fuller '94	December 27, 2014
William F. Guenther Jr. '42	May 14, 2016
Paul J. Herbert '59	December 22, 2014
Gerald Heyman '66	July 16, 2014
David L. Hoover '55	June 4, 2014
Henry Inouye '43	September 30, 2014
Don R. Kidder '65	September 8, 2014
Daniel P. Leibman '15	February 17, 2016
Clarence D. Meis '78	June 6, 2014
Richard M. Nash '65	January 11, 2015
John H. Nesbitt '58	January 8, 2016
Daniel E. Nisley '48	April 23, 2016
Donald H. Quam '53	January 9, 2015
Alan M. Simpson '44	July 1, 2014
Sherriane Streeter '74	January 15, 2016
Shane M. Wylie '99	November 2, 2015

compiled and written by **Ashley Spurgeon**

To submit an obituary for publication in the magazine, visit minesalumni.com/obituaries.

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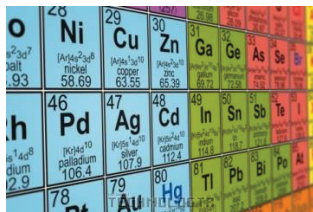
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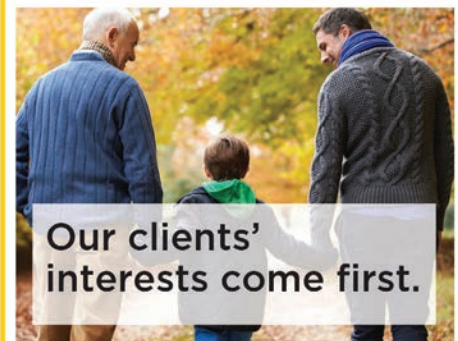


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MINER'S PIC



#MINESGEEK

Mines student Haley Whalen (metallurgical engineering, Class of 2017) is a self-professed geek. Haley, who won the #MinesGeek social media photo contest this summer, interned at a copper mine for Freeport-McMoRan Copper and Gold in Bagdad, Ariz. A fellow intern snapped this photo of her on a shovel used to load ore into haul trucks to be sent around the mine. "I love my school and my major and having the opportunity to learn about all different kinds of sciences, because they all work together to advance the world we live in," she says.

As one of the winners of the photo contest, Whalen received tickets to the President's Distinguished Lecture featuring Bill Nye during Homecoming.

Courtesy of Haley Whalen

Correction: The Miner's Pic caption on page 38 of the summer 2016 issue stated that the Mines Water Polo Club was founded three years ago, when in fact there was a previous water polo team that disbanded several years earlier. The current water polo team was restarted three years ago with new rules and regulations.



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