

From Mines to the Marines (and back)

Expanding lunar history

Reactor repair

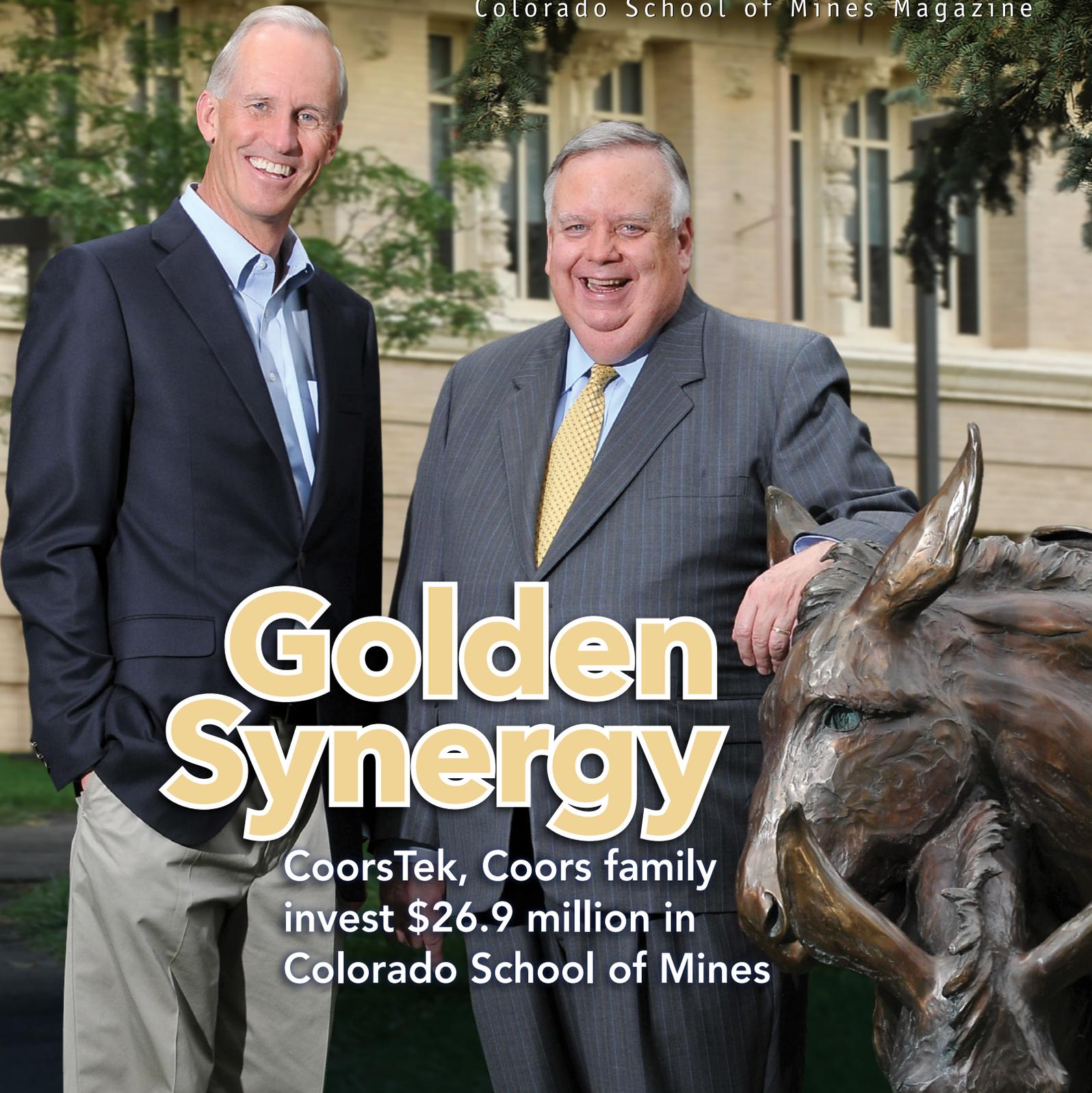
# Mines

Fall 2014 Volume 104 Number 3

Colorado School of Mines Magazine

## Golden Synergy

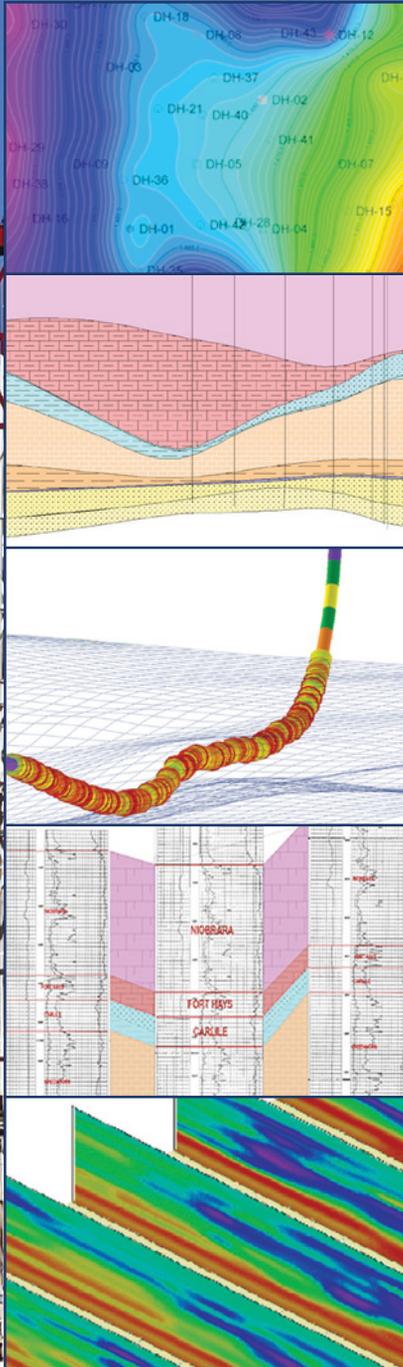
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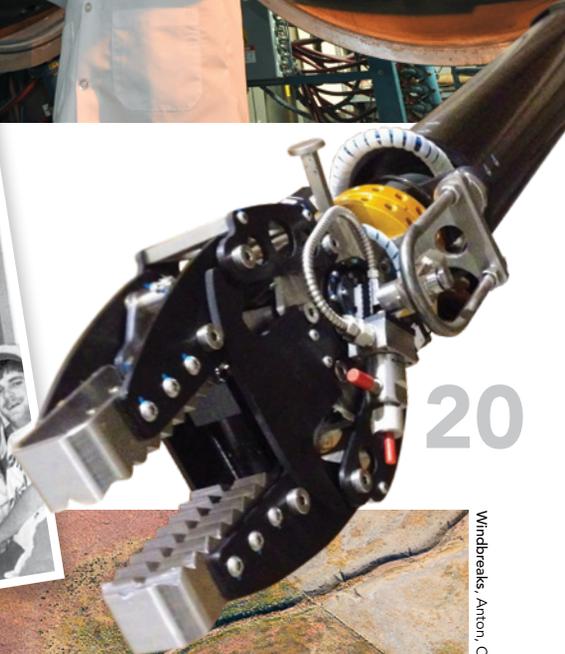
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**Cover photo:** CoorsTek Chairman, President and CEO John K. Coors '77 and Mines President Bill Scoggins stand outside Guggenheim Hall by the bronze burro statue, "A Friend to Lean On." The artwork, designed by Robin J. Laws, was presented to Mines by the Adolph Coors Foundation in 1995. Photo by Tom Cooper, Lightbox Images.

Windbreaks, Anton, CO. Evan Anderman

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## A note from the CSMAA President

As you may have already learned, we have filled two important positions that were vacated last year by Anita Pariseau and Serena Bruzgo. The new director of alumni relations is Nancy Blank, who comes to us from Colorado Mountain College with experience in program administration, nonprofit administration and the academic environment. Emily (Milian) Gonzales '08, CSMAA's new deputy director, also has experience managing nonprofit organizations and has renewed many friendships on campus. Both Nancy and Emily have made an immediate impact by coordinating with our campus partners.

Your alumni board is committed to working with the university and the Colorado School of Mines Foundation to advance the institution by expanding our outreach to alumni, fostering new and better events and programs, and targeting recent changes in the demographic profile of Mines alumni. Expansions to the school's curricula have resulted in growing alumni populations in manufacturing, aerospace and technology, in addition to those in earth sciences worldwide. We will serve all these locations with events and programming designed to provide engagement opportunities that are meaningful to each of you. Our number one goal is to connect alumni with each other and the institution by providing high-quality services, programs and events.

In the months ahead, here are some of the ways we will deliver on that promise:

- Host quality events and networking opportunities such as section gatherings, send-off parties and E-Days 'Round the World.
- Contribute to and attend events led by our campus partners that serve alumni and strengthen the Mines community.
- Expand our current 40 active U.S. sections to 51 in 2015 and enhance programming through increased volunteer outreach, support and training.
- Increase publication of the award-winning *Mines* magazine to four issues per year (print and online), featuring Mines news, events and alumni accomplishments.
- Improve communication with alumni and the campus through better benchmark reporting.
- Recognize alumni accomplishments through valued traditions such as Celebration of Alumni and Alumni Weekend.
- Engage and support students by partnering with the Student Alumni Association and by awarding scholarships.

You may have noticed some of these changes already through our email communications and social media (Facebook, Twitter and LinkedIn).

If you are not already using [minesalumni.com](http://minesalumni.com), I urge you to explore this website to find old friends, connect with other alumni, view the current board of directors, and contact the alumni office with any questions or comments you may have about the school. You'll be surprised by what you can learn.

Sincerely,

**Jim Larsen '65**

President, Colorado School of Mines Alumni Association

## LUNAR DISCOVERY

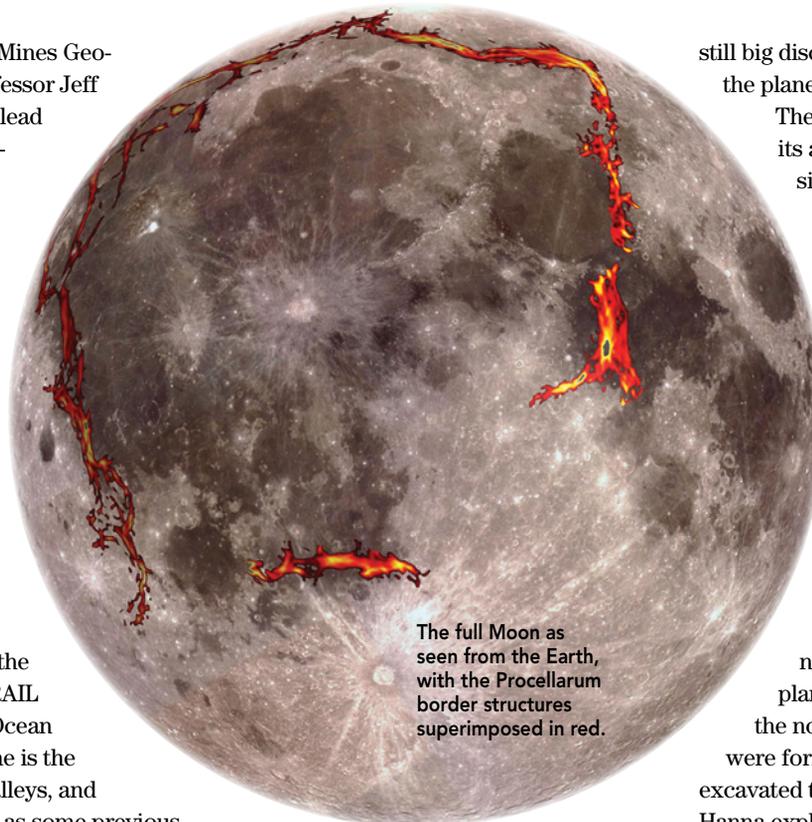
# Unearthing Moon's "Ocean of Storms"

Colorado School of Mines Geophysics Associate Professor Jeff Andrews-Hanna is the lead author of a study documenting the discovery of a giant rectangular structure (roughly 1,600 miles across) on the nearside of the moon.

Using NASA's Gravity Recovery and Interior Laboratory (GRAIL) data, he is part of a team that examined the subsurface structure of the Procellarum region, also known as the "Ocean of Storms." GRAIL scientists believe the Ocean of Storm's rocky outline is the result of ancient rift valleys, and not an asteroid impact as some previous theories suggested. The lava-flooded rift valleys are unlike anything found elsewhere else on the moon, and may at one time have resembled the rift zones on the Earth, Mars and Venus.

GRAIL gravity data is now allowing scientists to look beneath the surface at structures that are hidden from view, using the subtle gravitational pulls on the orbiting spacecraft. "This dataset has provided us with the highest resolution gravity map of any object in the solar system, including the Earth," explained GRAIL principal investigator Maria Zuber from the Massachusetts Institute of Technology.

Using the gradients in the gravity data to reveal the rectangular pattern of anomalies, the researchers can now clearly and



The full Moon as seen from the Earth, with the Procellarum border structures superimposed in red.

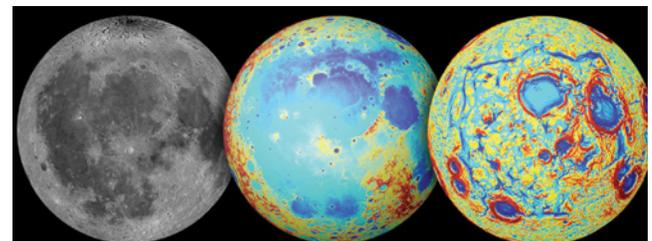
completely see structures that were only hinted at by previous surface observations. This newly discovered rectangular pattern has an area of approximately 6.5 million square kilometers (or 2.5 million square miles) and covers 17 percent of the surface of the moon.

"This rectangular structure covers a larger fraction of the surface area of the moon than do North America, Europe and Asia combined on the Earth," Andrews-Hanna said. "This goes to show that there are

still big discoveries waiting for us on all of the planets."

The rectangular pattern with its angular corners and straight sides is at odds with the notion that Procellarum might be an ancient impact basin, as that hypothesis would predict a circular basin rim. Instead, the new work suggests that internally driven processes dominated the evolution of this region. In contrast, previous work by Andrews-Hanna and colleagues in 2008 used gravity data from Mars to reveal an enormous elliptical structure in the northern hemisphere of that planet, supporting the idea that the northern lowlands of Mars were formed by a giant impact that excavated the "Borealis Basin." Andrews-Hanna explains, "In two separate studies, we have used gravity data to support the existence of the largest impact basin in the solar system on Mars, and to refute the proposed second largest basin in the solar system on the moon."

"Our gravity data is opening up a new



The moon as observed in visible light (left), topography (center, where red is high and blue is low), and the GRAIL gravity gradients (right). The Procellarum region is a broad region of low topography covered in dark mare basalt. The gravity gradients reveal a giant rectangular pattern of structures surrounding the region.

chapter of lunar history, during which the moon was a more dynamic place than suggested by the cratered landscape that is visible to the naked eye,” said Andrews-Hanna. More work is needed to understand the cause of this newfound pattern of gravity anomalies, and the implications for the history of the moon.

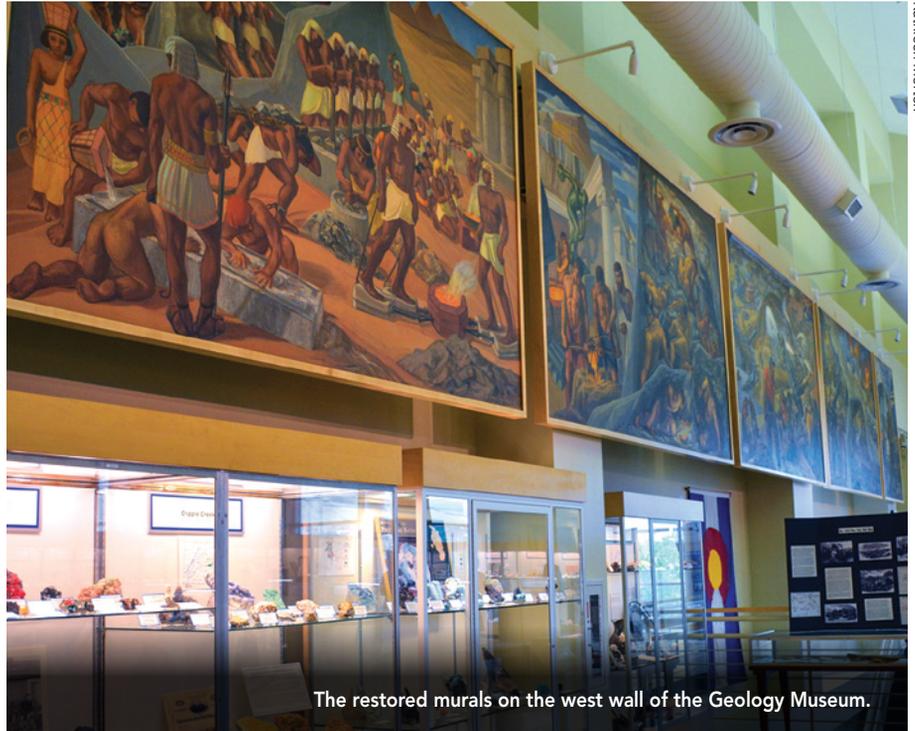
GRAIL A and B, later renamed Ebb and Flow, were launched to the moon in September 2011. The twin spacecraft flew in a nearly circular orbit until the end of the mission on Dec. 17, 2012. The gravity field was measured by tracking the changes in the distance between the spacecraft caused by perturbations to their orbit as they flew over anomalous masses caused by features on the surface or within the subsurface.

The GRAIL mission was managed by JPL, a division of the California Institute of Technology in Pasadena, California, for NASA's Science Mission Directorate in Washington. The mission was part of the Discovery Program managed at NASA's Marshall Space Flight Center in Huntsville, Alabama. GRAIL was built by Lockheed Martin Space Systems in Denver.

Andrews-Hanna's findings are published online in *Nature*. For more information about GRAIL, visit [grail.nasa.gov](http://grail.nasa.gov).

The following organizations participated in this research: Colorado School of Mines; University of California, Santa Cruz; Brown University; Southwest Research Institute; Lunar and Planetary Institute; University of Hawaii; Purdue University; NASA Goddard Space Flight Center; Massachusetts Institute of Technology; Carnegie Institution of Washington; and Columbia University.

—Kathleen Morton



The restored murals on the west wall of the Geology Museum.

**MINES GEOLOGY MUSEUM RESTORES 1930s MURALS** The Colorado School of Mines Geology Museum has been working on restoring six murals dating back to the 1930s, after the museum suffered ceiling damage from heavy rains in September 2013. Museum Director Bruce Geller collaborated with a team of art conservators, framers, construction workers and an art photographer over the past year in order to display the newly refurbished paintings at the museum's open house Sept. 10.

"It's the first thing you see when you walk in the room," Geller said. "Your eyes are drawn right to them. They are lower on the wall, so you see their size and how incredible the detail is for something that big. The colors are more vibrant because they cleaned off all the surface dirt."

The murals range in size from 7-by-5 feet to 7-by-11 feet, and the larger ones weigh around 150 pounds. New LED lights were installed above the paintings to bring out their colors.

#### Mural History

American painter Irwin Hoffman often accompanied his two brothers, who were mining engineers, on trips to mining camps in the U.S., Canada and Mexico. His knowledge of mining is portrayed in these murals, which he painted for the Golden Gate International Exposition in San Francisco in 1939.

In 1940, Mr. and Mrs. Barney Whatley donated Hoffman's murals to Mines. A year later, the *Denver Post* published a photo of former Mines president Melville Coolbaugh and Hoffman, when he visited campus to view his paintings on display in Berthoud Hall. In 1988, the murals were moved to the National Mining Hall of Fame until they were transferred to the Geology Museum in 2003.

The six murals showcase the history of mining from the Paleolithic era to the 1930s:

- earliest developments in mining
- mining and metallurgy in early Egypt
- Greek and Roman mining
- 20th century surface mining
- 20th century mining and reduction activities
- what man creates with metals

Some of Hoffman's smaller paintings and sculptures can be viewed in Arthur Lakes Library.



Thomas Cooper

**PRESIDENT'S CORNER**

**Hard Work, Perseverance and Collaboration**

It is always exciting to return to campus after enjoying time off in the summer, and this year it is particularly energizing as we celebrate our 140th anniversary as an institution of higher education. Mines has been unique from day one, with a mission specialized to meet the ever changing needs of Colorado, and a continuing mission to meet

global needs as we engineer solutions to the world's most pressing energy and resource problems.

And we continue to meet the demand for a Mines education as we break graduation and admission records. In May, we conferred degrees on 940 graduates of our bachelor's, master's, and doctoral programs—and the Class of 2014 also had the largest number of women graduates ever—260 (197 bachelor's, 47 master's and 16 PhDs). Even as we congratulated our newest alumni, we were preparing to admit more than 1,000 new students—the Class of 2018.

As we've seen our enrollment grow, we've also seen our faculty ranks grow. We launched an aggressive faculty recruiting program a few years ago and we've seen our total tenure/tenure track and teaching faculty numbers increase from 246 in fall 2011 to 287 this fall, with an additional 34 faculty searches initiated this academic

year. One outcome of this recent growth and hiring is that more than one-third of our full-time faculty have been on campus for four years or less. This reality creates its own challenges as well as opportunities. While we might lose some institutional knowledge, we do gain new perspective and the chance to adopt new practices that help keep Mines vibrant.

For 140 years, Mines has been home to talented scientists, engineers and scholars from all over the world who teach, create and move society forward. As a community, we have continually strived to improve ourselves and what we do, to respond to global and local challenges and to focus on the future with an innovative spirit.

From our extraordinary people to our unique mission to our beautiful campus nestled against Lookout Mountain, Mines is a special place. Every day I come to campus and reflect with pride on the work of our exceptional faculty, talented students, distinguished alumni and rock-solid staff. Together, we've given Mines a voice in the global conversation about how people interact with earth resources, energy and the environment. I hope you, too, take pride not only in all that we've done, but the way that we do it—through hard work, perseverance and collaboration. Thank you for your role in Mines' success and for the role you play in inspiring the next generation to carry on the good work at Colorado School of Mines for another 140 years.

—M.W. Scoggins

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## STUDENT SPOTLIGHT

# Encana Internship Leads to Full-Time Employment

Senior petroleum engineering major Tyler Barela, of Trinidad, Colorado, spent 12 weeks during the summer of 2014 working as an intern at Denver's Encana Energy. It was an experience that not only lent valuable corporate experience, but also landed him a job as a full time engineer upon graduation in 2015.

Barela worked as a reservoir engineering intern as part of the Denver Julesberg Development Team, mentored by Raymond Priestley '79, engineering advisor for Encana Corporation's Western Operations (and CSMAA board member).

"The advice I can offer to undergrads considering internships is put forth the effort to get industry experience now for it will open up so many opportunities upon graduation," Barela said, noting students shouldn't narrow their focus to one single company but should explore many different potential opportunities.

Barela spent his days working with reservoir and production engineers on a variety of projects including optimizing well performance. He was invited to weekly meetings and well reviews and gave his manager daily reports on his specific projects. He collaborated with other interns working on the geology and environmental side and coordinated with production and completion teams.

"I learned so much about the disciplines outside of reservoir engineering and saw how everything fits together in the oil and gas industry," he said.

The previous summer, Barela had a field internship with Encana and was initially worried about the transition to the office.

"Everyone on the team helped me tremendously, not only



From left, Encana summer 2014 interns Tyler Barela, Bethany Klinkerman, Christine Hrdlicka, Hayden Wambach and Julianne Wilson.

Courtesy of Raymond Priestley

with my project but with functioning as an engineer in the professional workplace," he said. "The people I worked with supplied so much knowledge that every hour was another learning experience."

According to Priestley, Encana has hired as many as 650 Mines interns from a variety of disciplines over the last 10 years. Mines has been a top source.

"Any Mines alum who wonders if the school is as hard or the students as bright as when they were on campus just needs to mentor a Mines intern. It will inspire you. Involve them and stand back, you will be amazed," said Priestley. "Tyler was the consummate Mines poster student for our institution—the student that employers come to Golden to hire: intelligent, hardworking, team oriented and inquisitive."

—Karen Gilbert



Kathleen Morton

**M CLIMB** Incoming Mines students made the annual trek up to the M on Mt. Zion Aug. 18. They placed their rocks on the monument and gave everything (including themselves) a fresh coat of whitewash. A Mines education continues to be highly sought after, as evidenced by a record 13,200 applications received for the 2014-15 academic year. New undergraduate enrollment was 1,000 freshmen and 159 transfer students, making it the university's largest incoming class. The incoming students match last year's most academically prepared student profile with average ACT scores of 30 and high school GPAs of 3.8 on a 4.0 scale.

## SPORTS

## Stitt Happens—A Century Milestone

It was nearly 14 years to the day that separated Bob Stitt's inaugural victory as the Colorado School of Mines football coach from his century-mark milestone.

On Sept. 9, 2000, a little-known former offensive coordinator at Harvard University walked out onto Brooks Field in his second game as head coach and guided the Orediggers to a 55-19 victory over Oklahoma Panhandle State University. It was one of only two victories that year, but it was a harbinger of things to come.

On Sept. 13, 2014, Mines steamrolled William Jewell College 46-0 at the North Area Athletic Complex in Arvada in the 2014 home opener. The triumph was the 100th of Stitt's career at Mines.

"It is all about the players," Stitt said. "I'm really proud to be able to be at one school this long and win 100 games – especially to win 100 games at an engineering school."

More than 1,300 fans were in attendance at the NAAC on Sept. 13 to witness the Orediggers' rout and Stitt's milestone. The coach said he hoped the victory would put smiles on the faces of all his current and former players because they each had a hand in helping him reach 100.

That said, it was only the second game of the season. Stitt isn't content to dwell on what he

has accomplished because there are so many more places he wants to take the Mines program in the future.

When Stitt replaced Versie Wallace in 2000, Mines hadn't had a winning season since 1991. After a 2-8 campaign that year, the Orediggers reeled off consecutive seven-win seasons, and in 2004 the program captured the Rocky Mountain Athletic Conference championship and qualified for the NCAA Division II playoffs for the first time. Mines earned a postseason victory that year behind star quarterback Chad Frieauf '05, who won the Harlon Hill Trophy as the nation's top player in Division II.

"That '04 class gets a ton of credit, but I think when people really knew where the program was, that success goes back to 2001," said Frieauf '05, who served as an assistant coach on Stitt's staff in 2012-13.

In the nine years since, Mines has had only one losing season, and five seasons have seen at least eight victories. In 2010 Mines survived the University of Nebraska-Kearney, 55-53, in triple overtime to secure its second RMAC crown and Division II playoff berth under Stitt.

"He's just an amazing offensive mind. Some of the plays he comes up with and his scheme as a whole has really brought him the success he's found," said former Oredigger quarterback Clay Garcia '11, MS '12, a finalist for the Harlon Hill trophy in 2010.

In 2012, Stitt moved into first place in career coaching victories at Mines with No. 85. He surpassed legendary coach Marv Kay '63 on that day.

"I think it's very difficult and I think it's a wonderful achievement. Bob's done it a heck of a lot faster than I did it," Kay joked. "It shows the quality of coaches and athletes we have today and the positive support of the institution."

In recent years fans have also had the chance to see the lighter side of the coach—look no further than the "Stitt Happens" mantra that has become a hashtag on Twitter and appears on T-shirts. It initially started two years ago in a tweet by former CBS Sports and current Fox Sports reporter Bruce Feldman.

—Brian Miller



Coach Bob Stitt celebrates his 100th win at Mines alongside Director of Athletics David Hansburg and the Mines football team.

Bryan Desch



Kathleen Morton

**CAREER DAY** On Sept. 9, 230 companies visited campus for Career Day to meet with more than 3,000 students and alumni at the largest collegiate career fair in Colorado and Mines' history. Industries including petroleum, renewable energy, mining, engineering and aerospace were in attendance, including 40 new companies this year representing biotech, automotive and robotics.



Kathleen Morton

**MUSEUM SPARKLE** The Geology Museum displayed this 6.2-carat fancy yellow diamond at its open house Sept. 10. A diamond's color is classified by a letter grade, ranging on a scale from D, which is totally colorless to Z, which is a pale yellow or brown color. Diamonds with more depth of color than Z color fall into the fancy color diamond range. "The fact that anyone is willing to give us a 6.2-carat diamond these days is great. People love it because it's so colorful, and with the LED lights, it looks like it's on fire," said Bruce Geller, director of the Geology Museum.

## BACK TO THE FUTURE

# Student Finishes Mines Degree After 21 Years in Marine Corps



Kathleen Morton



Travis Gordon (front row, third from left) with other Mines students.

Gordon stands in front of Guggenheim Hall in fall 2014.

Travis Gordon attended Mines from 1989-91, leaving in the middle of his degree to enter the U.S. Marine Corps. He reenrolled back at Mines during summer 2014 as a petroleum engineering student.

In the spring of 1989, Gordon was recruited from Grand Junction High School to play football at Mines by Marv Kay '63, former football coach and director of athletics.

"Marv Kay came to my house and sat down with my parents. Marv and my father went to school together, and even though Marv was a little older, my dad knew who he was. It was at that point, I decided to go to Mines," Gordon said. The common bond between the former Mines alumni provided Gordon with the trust he needed in his new coach and college commitment.

In his first two years at Mines, Gordon enjoyed playing football and rugby, but wasn't interested in the academics. He recalls a "less professional student" version of himself. Several of Gordon's friends were in the Marines and encouraged him to try something different. Inspired by the physical nature of the Marines, Gordon left Mines to enlist in spring 1992. Soon after his enlistment began, he completed his Marines bachelor's degree and was commissioned, pursuing flight school where he was designated as a Naval Flight Officer. Over the subsequent years, Gordon progressed through the ranks until he was selected to be a commanding officer. In his 21-year military career, Gordon traveled to more than 10 countries, including Iraq where he participated in Operations Southern Watch and Iraqi Freedom, and Afghanistan in support of Operation Enduring Freedom.

After more than two decades in the Marines, Gordon realized that if he wanted to finish what he had started at Mines, he would have to leave the military.

"I decided I wanted to get out (of the Marine Corps) when I was young enough to do something else. I spent several years away from my family and I wanted to get back to be close with them."

Gordon reenrolled at Mines this past spring, and is a full-time petroleum engineering student. He chose the major due to family influence and his interest in an occupation that balanced aspects of intellectual and physical demands.

Although he realizes it might seem odd that he's more than 20 years older than most of his classmates, he believes it keeps him young at heart.

"I am very impressed and motivated by the students here. The young men and women who are here are fully committed and know what they want to do. That's rare to see, even for a lot of students who have graduated college."

Over 23 years, Gordon noted the modernization of the Mines campus, including increased access to computer labs, simulators and wireless technologies. While he's impressed with the new buildings on campus, Gordon appreciates some of the old architecture that he remembers from his first years at Mines.

Golden has become "trendier" since the early 1990s, Gordon said, but he still enjoys frequenting older watering holes, such as the Ace High Tavern. "When I was here before, the Foss family businesses dominated Washington Street, now the only place I recognize from before is Ace."

For now, Gordon is focused on graduating Mines in spring 2016, spending anywhere from 60 to 80 hours on campus per week.

"I'm very happy to be here and extremely thankful to all the people who gave me an opportunity for a second chance to accomplish my goals and improve myself."

—Kathleen Morton

## WEARABLE TECHNOLOGY

## Professor, dancer create anti-injury activewear technology

Taking note of the high-end protective clothing that motorcyclists and car racers wear at events, former Denver Nuggets dancer Kady Zinke was dismayed there wasn't anything comparable for dancers.

Zinke, who founded her own activewear company, decided to take matters into her own hands. She reached out to Mines for engineering expertise and connected with Terry Lowe, a research professor in the George S. Ansell Metallurgical and Materials Engineering Department. They discussed the possibility of developing clothing that could help protect dancers from injury—specifically bruised knees. Knee injuries are among the most prevalent in dancers, and the protection that is offered currently tends to be “bulky, unattractive and constricting.”

Lowe wasn't convinced he could offer a solution or find the financial support to pursue the project.

“The constraints imposed by Kady were just too difficult: trying to put aesthetic, non-restricting, nearly invisible padding into dancer-style tights and still provide adequate protection,” Lowe said.

After nearly giving up on Zinke's concept, Lowe discovered a solution that could meet her requirements: crafting a new energy absorbing hybrid material system that combines shear-stiffening compounds (similar to cornstarch) and specially designed impact-lattices (that look like miniature bridge trusses).

“If you have an impact in one spot, the rest of the pad can contribute to absorbing energy. A pressure wave from the impact goes out into the shear-thickening fluid and transforms it to absorb energy,” Lowe said. “By adding in impact-lattices, you can design structures that absorb four or five times more energy than a typical foam.”

Incorporating the impact-lattices also helps the pads recover instantly from compression while keeping the same protection in place, which in turn reduces the trauma dancers experience from multiple falls.

In June, the duo received a \$30,000 grant from the Colorado Advanced Industries Accelerator Program to fund the assessment of the best currently available padding materials, and then design, fabricate, and test their new high performance product—nicknamed “Dancy Pants.”



Terry Lowe (far right) oversees the Anti-Injury Activewear research team, who are all part of the Nano-Structured Materials Research Group.

Over the summer, metallurgical and materials science student Michaela Rillings helped Lowe oversee the “Dancy Pants” project team of six students (four from Mines, one from University of Colorado Boulder and one from Princeton University). This school year, they are augmenting the group with two engineering senior design teams that will work on a new project concept design and fabricate materials.

After the team tested competitor products for information on how to optimize the energy absorption properties of their prototype, they discovered that micro lattices performed three times better than most energy absorbing materials.

“With these lattices, we can make it feel as soft as your cheek when you're wearing it. This new design gave us something we wanted but we didn't anticipate how much we could get with such control. It's soft at first but when it sustains impact, it's stiff,” Lowe said.

A competitive Irish step dancer, Rillings knows several people who have suffered impact injuries that have forced them to stop performing.

Currently, the team is testing how to customize the stiffness of the micro lattices so they could form to the body of each individual user. Their technology eventually could have many additional applications including other athletic gear, protective material for police and military personnel, and compact impact-tolerant packaging.

—Kathleen Morton



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# Golden Synergy

The name Coors and its connection to Golden, Colorado, is known the world over for more than most people think. While many of us are familiar with the Coors Brewing Company, there is another lesser-known enterprise connected to the Coors family more than a century old that touches our lives on a daily basis—that company is CoorsTek, and it has been a Mines partner since its founding.

In the winter of 1910, German-born potter John J. Herold found his way to the tiny frontier town of Golden, drawn not by the rush of gold but by the veins of fine white clay along the western edge of the Colorado School of Mines campus. He set up a kiln in an unused bottle manufacturing plant deeded to him by brewer Adolph Coors, collaborated with Mines professor Herman Fleck to perfect his glazing technique, and began rolling out ovenproof ceramic baking dishes for homemakers across America. The Herold China and Pottery Company, now known as CoorsTek Inc., was born.

A century later, the lesser-known sibling to the Coors Brewing Company has left casserole dishes behind and quietly grown into the world's largest producer of engineered ceramics, with 48 plants in 13 countries producing more than 300 different ultra-high-tech materials for use in everything from military armor to cell phone components to energy-saving fuel cells. Key to its success has been its close collaboration with Colorado School of Mines scientists, who continue to explore significant questions about the properties and potential for the unique and diverse class of materials some refer to as "white gold." Now CoorsTek is making the largest single private investment in Mines' history: \$26.9 million to help build the 95,000-square-foot CoorsTek Center for Applied Science and Engineering, purchase a \$1.5 million transmission electron microscope, and establish a new research fellowship program.

"CoorsTek and the Coors family have had a close relationship with Mines since the very beginning," says CoorsTek Chairman, President and CEO John K. Coors '77, the first of 11 Coors family members to have earned a Mines degree. "The new CoorsTek Center will elevate the level of research, scholarship and skills-building at Mines in connection with a company that can put directly to use the things that will be learned and developed here."

Adds Mines President Bill Scoggins, "Mines has grown tremendously over the last 15 years in terms of enrollment. But the one thing that hasn't kept up is infrastructure. Two years from now, thanks to this transformative partnership, we will be opening the largest, most high-tech facility the school has ever built."

CoorsTek, Coors family invest \$26.9 million in Colorado School of Mines

By Lisa Marshall

Photos by Tom Cooper, Lightbox Images



*CoorsTek Chairman, President,  
and CEO John Coors*

*Mines President Bill Scoggins*

## FROM CASSEROLE DISHES TO SUPERCONDUCTORS

While the Coors Brewing Company has long been a household name in Colorado, CoorsTek has maintained a notably lower profile. What exactly does CoorsTek make? John Coors prefers to answer the question this way: “What would happen if you snapped your fingers and all the parts we make went away?”

First, he explains, the lights would go out, because the electrical grid depends upon engineered ceramic parts as insulators. Then, your computer and cell phone would stop working, because virtually every semiconductor chip in the world is now made with equipment using tough, heat-resistant and chemical-resistant industrial ceramic. Your car would stall, because durable ceramic seals play a critical role in the longevity of your water pump. When you went to get a drink from a fast-food restaurant, your cup would come up empty, because the dispenser valve is made with corrosion-resistant ceramic parts. People with life-enhancing artificial hips would have to rely on wheelchairs because they depend on engineered ceramics and metals.

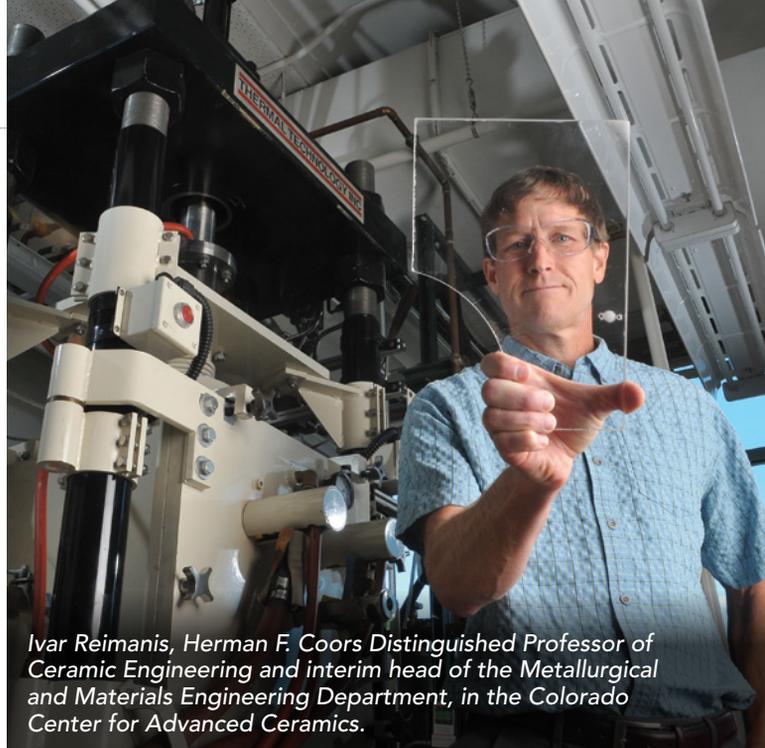
“You name a company, we probably make something for them,” says Coors, referring to a client list that now hovers around 10,000 worldwide. “Often, they’re little tiny pieces that go into unique applications that make people’s lives measurably better.”

At their most basic, ceramics originate from fine dirt-like clay. “But when you look at the diversity of properties you get when you process that dirt the right way, it is pretty amazing,” explains Ivar Reimanis, the Herman F. Coors Distinguished Professor of Ceramic Engineering and interim head of the Metallurgical and Materials Engineering Department.

Depending on how they are fabricated, engineered ceramics can be nearly as hard as diamonds, resist extreme heat and corrosion, possess exceptional insulating qualities, or conduct electricity super-efficiently. That makes them attractive alternatives for novel, tricky applications where metals and plastics won’t do.

In the late 1800s, German ceramists perfected specialized ceramics for use in laboratory equipment like mortars and pestles, which must withstand extreme heat and caustic chemicals. But after war broke out in 1914, that German source dried up due to embargos. “There were only two companies in the U.S. that were able to make it and we, a tiny little company in Golden, Colorado, were one of them,” says Coors.

The company’s World War I-era entrée into the scientific chemical-ware market put it on the map and provided a means of



*Ivar Reimanis, Herman F. Coors Distinguished Professor of Ceramic Engineering and interim head of the Metallurgical and Materials Engineering Department, in the Colorado Center for Advanced Ceramics.*



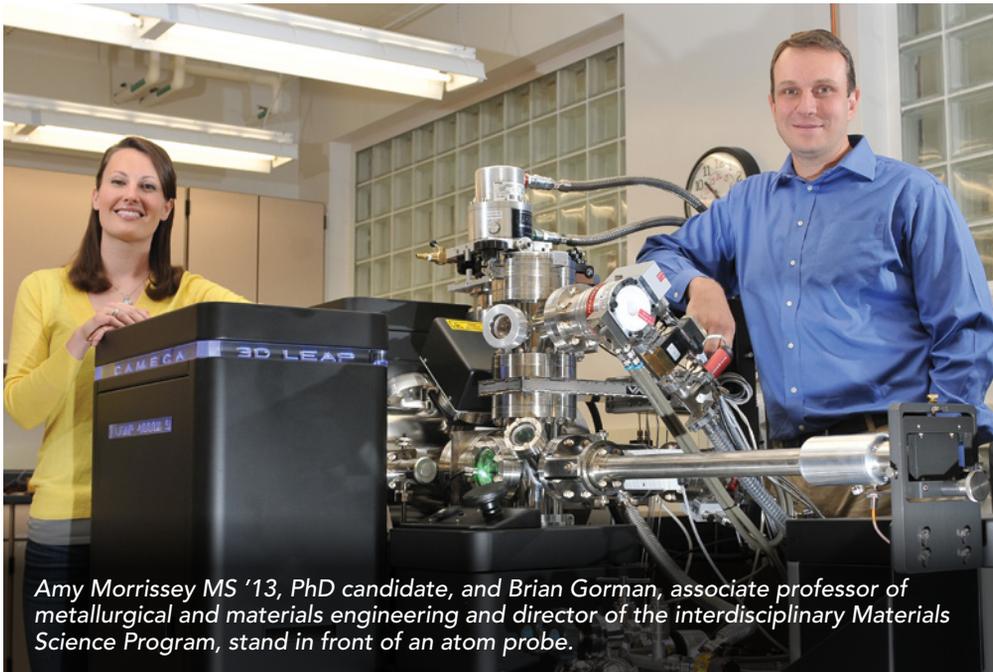
*Ruthie Coors Swartzlander '03 in CoorsTek's manufacturing plant.*

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# A brief history of CoorsTek

**1873**  
Coors Brewing Company  
founded

**1886**  
Coors opens Colorado  
Glass Works to make  
beer bottles



*Amy Morrissey MS '13, PhD candidate, and Brian Gorman, associate professor of metallurgical and materials engineering and director of the interdisciplinary Materials Science Program, stand in front of an atom probe.*

veterans, or loved-ones of veterans, personally thank him for the lives saved. “It’s pretty easy to get emotional just thinking about it.”

**A TEAM EFFORT**

In 1988, CoorsTek helped establish the Mines-based Colorado Center for Advanced Ceramics, a national focal point for research on advanced ceramics. That same year, the Coors family funded a \$2 million endowment to hire the first Herman F. Coors Distinguished Professor of Ceramic Engineering. Today, the center boasts nine faculty and 24 graduate students.

“The Coors family essentially spawned the advanced ceramics effort at Mines, something that is now internationally recognized,” says Reimanis. “It’s very important

sustaining the company, many local families, and Golden’s industrial base during the prohibition years (1916-1933). By 1932, Coors Porcelain (as it was called at the time) had captured 90 percent of the U.S. chemical-ware market and employed more than 200 people even amid the Great Depression.

By the time World War II rolled around, the U.S. government was well aware of the promise of ceramics, and turned to the company—fast earning a reputation as the technological hub in the field—to provide ceramic insulators for military aircraft, ceramic nose cones for radar-controlled defense rockets, and even top-secret materials for the Manhattan Project, according to the book “Ceramic Strength: CoorsTek at 100.”

In the '60s, the company began to produce ceramic substrates for use in electronics. In the '70s and '80s it expanded its reach into the realm of oil, gas and mining, where companies sought ultra-tough materials that could take the punishment of constant use in abrasive conditions like chutes in a mine or tubes in an oil well. During the Gulf War in the '90s, it developed lightweight, alumina body armor inserts that could stop a bullet.

“Without them, there would have been significantly more fatalities,” says Coors, who has over the years had numerous

for engineering educators and students to be aware in real time what challenges industry faces. The close connection to CoorsTek allows us to bring into the classroom examples that are current, from the company right down the street. It is invaluable.”

In turn, Mines researchers and students have helped the company answer some of the most fundamental questions about how ceramics are structured, what happens to them when subjected to heat, pressure or other stimuli, and how to better fabricate them.

“Time to market is a critical issue. The company that solves the customer’s problems the fastest wins. So it is critically important for us to access technical resources wherever we can, and certainly Mines’ proximity is great,” says Frank Anderson, vice president of research and development for CoorsTek. “We also hire a lot of Mines grads.”

Among them was Ruthie Coors Swartzlander, who graduated in 2003 with a bachelor’s degree in metallurgical and materials engineering. During her time at Mines, she occasionally bumped into her father Grover Coors '96, PhD '01, who was earning his doctorate at the time.

**1910**

**Herold China and Pottery Co. starts making cookware in abandoned bottle manufacturing plant**

**1913**

**Adolph Coors becomes president of Herold China and Pottery**

**1916**

**Colorado bans alcohol  
Coors switches focus to ceramics**

**1920**

**Company is renamed Coors Porcelain**

**1932**

**Coors Porcelain reduces 90 percent of U.S. scientific chemical ware**

**1940s**

**Company gets into sparkplug business**

**1950s**

**Company makes nose cones for radar-controlled defense rockets**

"I think we were the only father and daughter to ever be at Mines at the same time," says Swartzlander. "We had a race to see who was going to finish first, and he won."

After graduation, she went to work with him, researching fuel cell technologies at CoorsTek. Within three months on the job, she made a mistake that ended up being a pivotal discovery. Her dad asked her to make an anode—essentially a thin, porous ceramic-metallic composite that serves as an electrode in a fuel cell. The confident new grad gathered all the materials she thought she needed and went to work in the CoorsTek lab. But as she crafted the anode she left out a key ingredient.

"It turns out that making ceramic is kind of like baking a cake and everyone was using a special mix that was really expensive. I got the wrong ingredients and put them together, and one ended up reacting with others in a way that no one had observed before." At first, her dad looked with skepticism at her creation. But further testing showed it was mechanically sound. The next day, they filed for a patent for the process (called solid state reactive sintering). One year later, the Mines-based Colorado Fuel Cell Center—a national hub for fuel cell research—was born.

"...It's about connecting students, researchers, faculty and industry, and having an impact not just on this place, but around the world in ways we cannot even begin to predict today."

—John Coors '77

Swartzlander's discovery of reactive sintering has motivated extensive follow-on research in the Colorado Fuel Cell Center. Several graduate students have authored theses related to reactive sintering of fuel-cell materials and other advanced technical ceramics.

"It simplified production of fuel cells and made them more commercially feasible, blazing the trail toward a whole host of new, sustainable energy technologies," says Swartzlander.

#### FROM CLEANER ENERGY TO STRONGER TANKS

On a recent afternoon in a third-floor lab in Hill Hall, graduate student Amy Morrissey MS '13, slipped a needle-shaped sample of a ceramic fuel cell membrane roughly 1,000 times smaller than the width of a human hair

into a million-dollar machine called an atom probe. With the flip of a switch, the probe ripped the material apart, atom by atom, first taking a 3D, ultra-high-resolution map of where each atom was and what elements were present.

"Fuel cell applications are limited, and one reason is that there are still some fundamental scientific discoveries and challenges that we have to overcome as scientists," says Morrissey, a PhD candidate in the metallurgical and materials engineering department. "Equipment like this is getting us there."

A key first step in understanding the strengths and shortfalls of existing materials is to observe their structure at the atomic level, says Brian Gorman, an associate professor of metallurgical and materials engineering and director of the interdisciplinary Materials Science Program at Mines. For instance, by looking closely at "grain boundaries," the interfaces where tiny, sand-like bits of ceramic come together to make a whole, they can discover what atomic snags might be hindering the smooth flow of hydrogen across a fuel cell, or making glass vulnerable to breakage at those boundaries.

"When we had just clay and fire, that was the earliest engineered ceramics. Nowadays, we have indestructible windows, space shuttle tiles, superconductors, and solar cells—all made of engineered ceramics. None of that would've been possible without studying the atomic structure," says Gorman.



CoorsTek received Mines' first Corporate Partnership Award, accepted by John Coors at the Mines Evening of Excellence, held Sept. 26, 2014. In attendance were, from left: Michael B. Swartzlander '02, MS '03; Ruthie Coors Swartzlander '03; CoorsTek Vice President, Research & Development Frank Anderson; CoorsTek Vice President, Global Technology & Market Development Randel Mercer; Mines President Bill Scoggins; Andrew Coors; CoorsTek Chairman, President and CEO John K. Coors '77; Sharna Coors and Aimee Coors.

1959

Produces world's first seamless, lightweight aluminum can

1960s

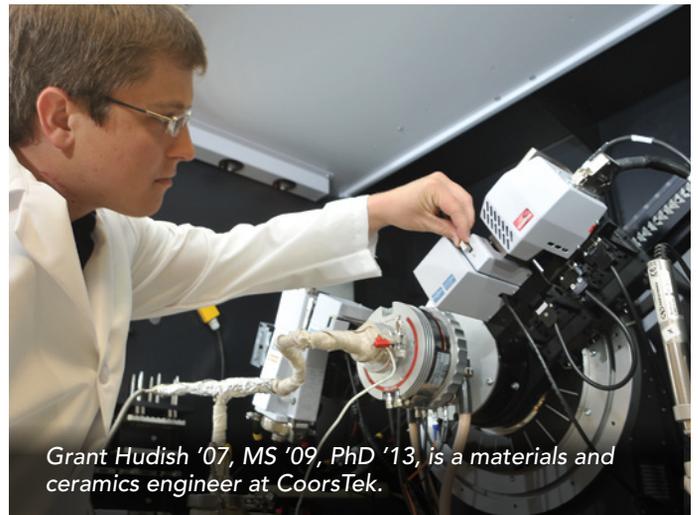
Provides components for Apollo space missions



CoorsTek Chairman, President, and CEO John Coors and Mines President Bill Scoggins in CoorsTek's "Idea Room" at the company's Golden headquarters.



Randall Versaw '83 is a quality manager at CoorsTek.



Grant Hudish '07, MS '09, PhD '13, is a materials and ceramics engineer at CoorsTek.

Down the hall, Reimanis and his graduate students use those basic scientific discoveries to develop next-generation ceramics that outperform those of today. For instance, using funding from CoorsTek, they're working on an ultra-tough clear ceramic called Spinel. Spinel is one-fourth the thickness and weighs less than half that of ballistic glass, reducing optical distortions and design barriers. It could someday be used for bulletproof, yet clearly see-through windshields in armored vehicles.

#### LOOKING TO THE FUTURE

CoorsTek's \$26.9 million investment, paired with \$14.6 million from the state of Colorado, will enable the school to build what President Scoggins calls "an integral campus landmark and dynamic hub of rich intellectual exchange." The CoorsTek Center will primarily support the College of Applied Science and Engineering at Mines with laboratories, classrooms, and centralized teaching and research space all on the grounds of the current physics building, Meyer Hall.

Reimanis sees the investment as a turning point for Mines, and one that will enhance its technical capability, draw high-quality

faculty and research grants, and in turn support improved education of students who can go out into the industry and make change. "I think it will have a real snowball effect," he says.

John Coors, whose two sons and several nieces and nephews have attended Mines, agrees.

"This is not just about a building. It is about much more," he says. "It's about connecting students, researchers, faculty and industry, and having an impact not just on this place, but around the world in ways we cannot even begin to predict today."

Coors added, "this investment in the CoorsTek Center at Mines should produce several great outcomes. First, Mines will be a more powerful institution. We will be able to attract more world-class research scientists, faculty and students from around the country and around the world. Next, we expect breakthrough results in development of new materials, improved processes and new approaches to using our collective competencies to make the world measurably better. Ultimately, we are out to transform lives through what the school has to offer: the lives of those of students here today, those who are coming in the future, and those of people around the world. I believe in value creation—taking what we have been given and what we have achieved then leaving something greater behind. There should be something more for those who come after us. As I think about what we have just announced, I consider this an investment in people we will never meet, who will live better lives because of our collective commitment to Mines." M

**1970**

**Produces seal rings for auto water-cooling systems, quadrupling life**

**1980s**

**Develops first smokeless cigarettes, ceramic golf putters, and buttons**

**1990**

**Enhances its lightweight armor for soldiers, helicopters, and tanks in Gulf War**

**2000**

**Company is renamed CoorsTek**

**2002**

**Makes components for new post-911 airport security scanners**

**2011**

**Makes ceramics for use in high-intensity light beam at Ground Zero memorial**

Source: Ceramic Strength: CoorsTek at 100

On a sweltering August day at Japan's crippled Fukushima Dai-ichi Nuclear Power Station, four technicians clad in biohazard suits wheeled a Colorado-built robot up to the towering nuclear reactor unit No. 2, bolted it to the floor, and quickly walked away. Hours later, with operators controlling it via joysticks at a safe distance, the refrigerator-sized bot came to life, unfolding like a Transformer as it snaked its 30-foot-long arm through a hole in the reactor wall, and into the "primary containment vessel." When the arm came out, it brought the first images of the havoc wreaked inside by the devastating earthquake and tsunami that hit the plant in 2011, and a much-needed roadmap for how to repair the damage.

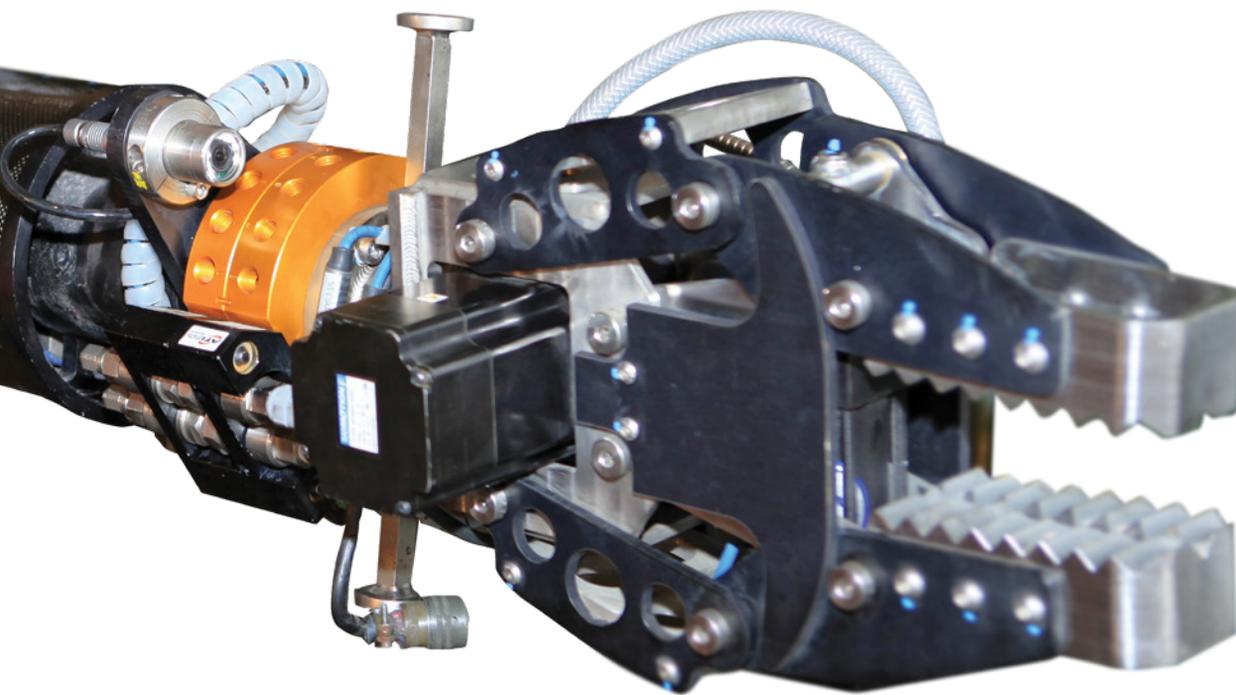
"It was definitely a pins and needles day for us," says Marc Rood '03 whose Loveland-based Remote Systems and Services team designed and built the bot. "It's not like you can just walk in and fix it if it doesn't work."



# REACTOR REPAIR

Colorado-built  
robot playing key  
role in Japanese  
nuclear cleanup

By Lisa Marshall



The Aug. 9, 2014, deployment of the Fukushima Inspection Manipulator (FIM) marked a pivotal day in the life of Rood and a small team of Colorado engineers who—just 18 months ago—were staring down a bankruptcy and wondering where their next paycheck was coming from.

Today, instead of job-hunting, they've sealed a lucrative contract that could lead to decades of work, and are preparing to move into a larger Denver facility for their growing staff. As a newly acquired division of California start-up Kurion Inc. (the only U.S. company directly contracted to help, in Fukushima) they're also poised to play a key role in the cleanup of the worst nuclear disaster since Chernobyl.

"There are only a handful of companies in the world that have the capability to help and we are one of them," says Rood, who graduated from Mines in 2003 with a bachelor's degree in engineering, civil specialty.

#### A TALE OF TWO HELPERS

On March 11, 2011, a 9.0-magnitude underground earthquake hit Japan, killing nearly 16,000 people and sending a 30-foot wall of water toward Tokyo Electric Power Company's (TEPCO) Fukushima nuclear power facility. Meltdowns and explosions ensued inside the plant's six nuclear reactors. The seismic jolt formed cracks in their containment vessels, letting cooling water leak out and leaving radioactive fuel inside

to heat to dangerous levels. To cool the fuel and avert further explosions, TEPCO began pumping roughly 350,000 gallons per day into the reactors. But soon that contaminated water began to leak through the cracks into adjacent buildings and basements, threatening to overflow.

"We are talking about water that is so hot radioactively that if you stepped into it you would get a radiological burn," says John Raymont, a nuclear industry veteran who founded Kurion Inc. in Irvine, California, in 2008. "It was already a catastrophe. If this would have gone into the ocean, it would have been a catastrophe squared."



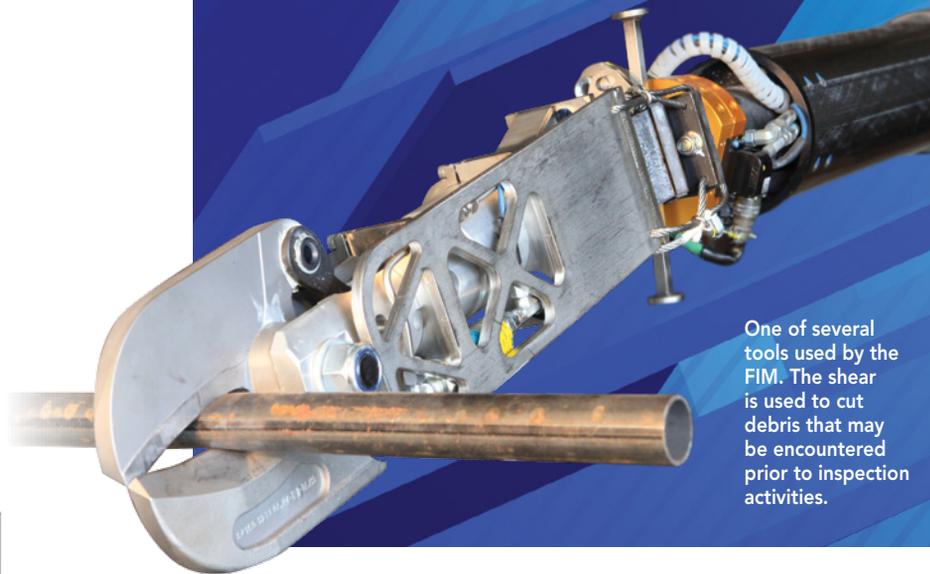
The IHI team in Fukushima.

At the time, Kurion had only six employees. But Raymont was convinced he could create a system that could help remove the most concerning radioactive isotope, cesium, from the leaking water. Unable to reach TEPCO officials by phone, he issued a press release describing the company's technology. Two days later he was meeting with TEPCO officials. "It was like something that would only happen in a movie," recalls Raymont.

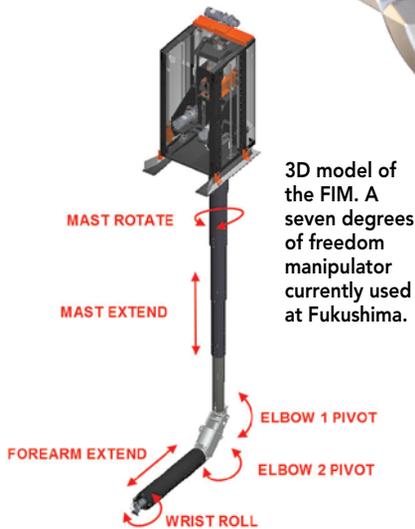
On June 17—just three months after the disaster—Kurion's external cooling and purification system was in place at Fukushima, ridding leaking water of deadly cesium, pumping the water back into the reactors to cool the fuel, and storing the still-toxic, but less-so, extra water in 50-foot-tall tanks. "The first step was to get the dose levels down, so the workers could get near the building and begin the cleanup process," explains Raymont.

Meanwhile, 9,000 miles away in Loveland, Rood and his colleagues at the now defunct company, Special Applications Technology (SAT), also had a hunch they could help.

Founded in 1992, the 125-employee company had developed more than 170 custom-built remote robots for complex nuclear and chemical cleanups, including the Rocky Flats Plant. In Fukushima, they envisioned, they could build lightweight, high payload carbon arms able to squeeze into tight places and lift heavy loads. "In the nuclear field,



One of several tools used by the FIM. The shear is used to cut debris that may be encountered prior to inspection activities.



3D model of the FIM. A seven degrees of freedom manipulator currently used at Fukushima.

every problem is unique. There is not one specific, off-the-shelf solution that fits every need. We create the solution. That is our niche,” says Rood, who joined SAT in 2008.

He reached out to contacts in Japan post-tsunami and in 2012 SAT landed a job as a subcontractor to devise a robot with Japanese firm IHI Corporation. Loveland-based engineer Matt Cole, who had been with SAT since age 16, got to work on a design.

Then, in April 2013, the hammer came down. Citing significant revenue decreases in some areas of the business, due largely to cuts in U.S. government spending, the private equity group that owned it laid off all SAT workers and abruptly closed up shop.

“Our Japanese client was ready to pull the plug, but we said ‘just wait—give us two weeks,’” recalls Rood. He and Cole put together a business plan, asked three fellow-employees to join them and began knocking on the doors of potential buyers. “We were not saying ‘you can buy this widget from us’—you were buying the brains, and the Fukushima contract came along with us.”

Soon thereafter, Rood’s team joined Kurion Inc.

“Most employees in a circumstance like that just walk away. But they deeply believed in what they were doing and how it could help people,” says Raymont. “They deserve the credit for sticking with it and taking the risk.”

### A SYSTEMIC APPROACH TO NUCLEAR CLEANUP

In the coming years, as the legacy divisions of Kurion continue the formidable task of cleaning up water at Fukushima, Rood’s team will be working on the problem from a different angle: looking for water leaks and fixing them.

During its pilot journey this summer into reactor No. 2, the robot—which Rood dubs the “Swiss-army knife of robots”—used an array of gadgets to cut through and move debris as well as shoot photographs and video. The robot also dropped in three mini-rovers attached to the end of an arm via a long thin umbilical cord that

looked for leaks inside the reactor.

“It’s always really nerve wracking when you deploy something like this, but so rewarding to see it succeed,” says Cole, the brain behind the FIM and now director of Kurion’s Remote Systems team.

Through March 2015, the robot will explore seven other locations throughout the enormous reactor, and ultimately Rood, who is director of business development for the division, hopes to see similar bots deployed in some of the other damaged reactors at the plant.

Already, the team returned to the drawing table and in September kicked off the Fukushima Repair Manipulator (FRM) that will repair the leaks in reactor No. 2. It will be delivered in 2016.

Even so, the job is far from over.

Kurion (now 10 times its original size) recently delivered a second system designed to remove radiation-emitting strontium from stored tank water, further improving worker safety. A system to remove another isotope, tritium, is also in the works.

Meanwhile, the ultimate core of Fukushima’s problem—the nuclear fuel inside the reactors—remains. In October, Kurion and partner IHI were awarded the “concept design for fuel debris removal,” a plan that proposes using one of its robotic systems to remove and safely dispose of the fuel.

“We came from a company that went bankrupt to a company that is doing critical work on a problem of global importance,” says Rood. “We are very proud of this.”

Rood’s group is currently pursuing other commercial nuclear reactor decommissioning opportunities around the world as well as legacy site waste cleanup efforts largely in the U.S. and the U.K. 



Members of the Loveland-based Kurion RSS team. Front to back: Marc Rood '03, Paul Linnebur, Matt Cole, Mike Auen and Matt Auen.



# ENGINEERING *YOUR* CONNECTIONS



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**ALUMNI ASSOCIATION**  
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# ALUMNI NETWORK

## MELVILLE F. COOLBAUGH MEMORIAL SENIOR AWARD

### Brandon Tortorelli

Mines engineering physics student Brandon Tortorelli was recently awarded the CSMAA Melville F. Coolbaugh Memorial Senior Award.

The award is a prestigious financial award given since 2007 in honor of former Mines President Melville F. Coolbaugh. It is awarded to a high-achieving student who demonstrates financial need and is graduating within the academic year. The recipient is perceived as being someone who will “make a positive contribution toward upholding the image and enhancing the reputation of Mines after graduation.”

Tortorelli, who (in addition to his academic load) is involved in the CSM Rocket Club, serves as an international student mentor and volunteers as a STEM teacher with the Jefferson County Boys and Girls Club—has the potential to do just that.

“I mainly teach fun, hands-on, interactive lessons about space science to underprivileged students in the Denver area,” he said. “I do this with the hope that I can influence some of these students to pursue careers in STEM fields, possibly at Mines, by exciting them about cool new scientific fields and informing them of financial opportunities that can allow them to reach for the stars.”

Tortorelli is a previous recipient of the Boettcher Foundation Scholarship and recently completed a policy minor through the McBride Honors Program.

“This school has given me the opportunity to meet some of the most intelligent, creative and exciting people that have ever lived,” Tortorelli said. “I am proud to call myself a student



Kurtis Gress

of Mines, and I will be even more proud to live a life as a Mines alumnus who can give back to the institution and the community that have helped me find myself.”

Tortorelli noted the long-lasting bonds between Mines students, alumni, and faculty “form a network of enlightened individuals who are bound to change our world for the better... I look forward to the day when I can see my own contributions bear fruit on the Mines family tree.”

After he completes his bachelor’s degree in engineering physics, Tortorelli plans to pursue his master’s in mechanical engineering at Mines and to continue his goal of summiting all of Colorado’s 14ers.

—Karen Gilbert

## LIFE MEMBERS

The Colorado School of Mines Alumni Association gratefully acknowledges its new Life Members, welcomed between January 1, 2014 and September 1, 2014.

Daniel B. Adams '01  
Andriena-Marie Barendt '13  
Janelle Bartscherer '03  
Kinzie Beavers '10  
Mark Bedford '02  
Juan Beltran '13  
Brian Berwick MS '08  
Magdalena '00 and  
Eric '02 Boogaard  
Judith '75 and Mike '75,  
MS '79 Brazie  
Helena Chouinard '07  
Stanley Churchwell '14  
Bruce Clements '77  
Hector Cruz '94

Nathan Davis '97  
Michael K. Decker '77  
Simone Aiken '01 and  
Michael Driscoll, Jr. '00  
Andrew Eilers '12  
Lee Fanyo '04, MS '05  
William Fleckenstein '86,  
MS '88, PhD '00  
Jonathan Freeman '84  
Kevin Gill '14  
Will Godbey '79, MS '82  
Amy Goodson '09  
Charles Harkey '09  
Adam Hasskamp '11

Elizabeth Newton Hayes  
'08 and Justin '08 Hayes  
Erik Hessler '13  
Patrick Hickey '81  
Matthew J. Hoffman '94  
R. Kris Jensen '00  
Daniel Jones '94, MS '97  
Joseph Katz PhD '91  
Anthony Kenck '79  
Joshua Kovacich '13  
Brentton Leeper '14  
John R. McConnell '75,  
MS '77  
Samantha Meador '91  
Robert Michel '84

Arthur Morris IV '96  
Mickey Moulton '10  
Julie '86 and Mark '86  
Mueller  
Jennifer Nekuda Malik '05,  
MS '06, PhD '08 and  
Rishi '05, MS '06 Malik  
Thomas Netzel '80  
Amber Parmet '09  
Eric Phannenstiel '86  
Raymond Priestley '79  
Danielle Reader '93  
Elizabeth Reigles MS '97  
Richard Rein '75, '77, MS '86  
Jeffrey Rice '94

John Roucis '79  
Jacob Rundell '09  
Sean Santos '08  
Adam Schroeder MS '12  
Jamie Sears '04  
E. David Seymour '85  
Nathan Siedler '08  
Ellen Simmons '04, MS '05  
Teresa Spann '04  
Holly Jo '91 and John '86  
Sprackling  
Arielle Steers '13  
Thomas P. Young '83, MS '93  
Loren Zeigler MS '13  
Phillip Zelenak '06, MS '10

To join the exclusive group of more than 1,060 CSMAA Life Members, visit [minesalumni.com](http://minesalumni.com) and click “Join Now.”

## BIKE BIKE QUE

The annual Bike Bike Que was held in Golden on Sept. 13. Around 20 riders (all cyclists this year) met at the Coolbaugh House in the morning, rode out to Bear Creek Lake State Park, and then biked back to campus for a barbecue catered by Famous Dave's. AC Golden Brewing Company donated plenty of Colorado Native beer and Golden Touch Wellness Center provided complimentary massages for sore shoulders and legs. The Mines Cycling Team led the route and gave everyone an update on the team's activities.



Courtesy of Alyse White, current student

From left, Robert Bruzgo '95, Richard Jarboe '67, Debbie Dean, Edwin Supple (current student, Mines Cycling Team member), Patrick Stevens '96, MS '03, PhD '12, Roy Dean, Alex Patel (current student, Mines Cycling Team member), Arianne Dean '09, MS '11, Karl Zachry '82, Cathy Campbell, Pat Phillips '61 and David List '84.



## KUWAIT COMMUNITY

On Sept. 22, members of the Colorado School of Mines Alumni Association Kuwait Chapter enjoyed an informal networking dinner hosted by Kuwait Oil Company featuring honored guest Tom Davis PhD '74 (center), director of Mines' Reservoir Characterization Project. Next to Davis are Mohammad Al-Bahar '99, and Bader Al-Attar '92, of Kuwait Oil Company.

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President

Raymond Priestley '79  
President-elect

Paul Roamer MS '97  
Treasurer

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Hanna Aucoin (graduate  
student representative)  
Oliver Dewey '12  
Scott Hodgson '03  
Tyrel Jacobsen (undergraduate  
student representative)

Alicia Jessop '06  
Brady McConaty '78  
Norma Mozée '83  
Tim Saenger '95  
Matthew Showalter '99  
Cooper Swenson MS '04  
Mahesh Vidyasagar MS '00  
William Warfield '75

## STAFF

Nancy Blank  
Director of Alumni Relations  
Emily (Milian) Gonzales '08  
Deputy Director of Alumni Relations

Ruth Jones  
Associate Director, Programs

Sandr Kohl  
Office Manager

Linda Nothnagel  
Jo Marie Reeves  
Nancy Webb  
Angie Yearous '91  
Administrative Support (part-time)

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



# CLASS NOTES

**1957**

**Cecil I. Craft** is the owner of Central Exploration and lives in Larkspur, CO.

**1964**

**Daniel K. Fix** is a vacation counselor for Diamond Resorts International and lives in Cornville, AZ.

**1966**

**W. Robert Nichols III** is president of Rusty's Oilfield Service and lives in Dallas, TX.

**1967**

**Donald W. Howard** is working for Insuperity and lives in Houston, TX.

**1969**

**Robert C. Nelson** is a urologist and lives in Roswell, NM.

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

**1971**

**Jerald E. Jones** is president of EnergyTech based in Lakewood, CO.

**1973**

**E. Thomas Cavanaugh** is the owner of Geocav Consulting and lives in Arvada, CO.

**David M. Schwartz** is business development manager for CGG GravMag Solutions and lives in Houston, TX.

**1974**

**Albert C. Compton** is principal engineer for Access Midstream and lives in Shreveport, LA.

**1975**

**Richard E. Ackermann** owns Ackermann Mining Services and lives in Elko, NV.

**1976**

**Randal L. Bruno** is a project engineer for Gilbane Federal and lives in Stockton, CA.

**James P. Daniel** is president of Preston Daniel Resources based in Marietta, GA.

**Mick Hanou** has retired after 38 years of working for Gulf/Chevron and lives in Pleasanton, CA.

**Alan J. Hurd** is a physicist for Los Alamos National Laboratory and lives in Los Alamos, NM.

**Charles R. McLendon III** is senior manager for the Texas Department of Transportation and lives in Dripping Springs, TX.

**Michael E. Miller** owns Alaska Oil and Gas Operations Consultants and lives in Anchorage, AK.

**Arthur P. Schwab** is a professor for Texas A&M University and lives in College Station, TX.

**1977**

**Gary L. Jones** works for IHS and lives in Katy, TX.

**Joey V. Tucker** is a national content advisor for ExxonMobil Development and lives in Magnolia, TX.



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## COLORADO SCHOOL OF MINES RECENTLY\* RECEIVED 10 OUTSTANDING LEADERSHIP GIFTS AND COMMITMENTS:

**BP** committed \$140,000 to support BP Scholarships and the Center for Academic Services and Advising.

**CoorsTek** and the **Coors family** invested \$26.9 million—the largest single private commitment in Mines' 140-year history—to fund the construction of the 95,000-square-foot CoorsTek Center for Applied Science and Engineering, establish the CoorsTek Research Fellows Program and fund the purchase of high-tech equipment.

**Daniel F.** '69 and **Linda M. Evans, Terry J.** '70 and **Jean Laverty,** and **John T. McDonough** '69, provided gifts totaling \$107,500 in support for the Emerging Countries Undergraduate Scholarship Fund.

**Ben L.** '62 and **Judy Fryrear** committed \$750,000 to establish the Ben L. Fryrear Endowed Professorship Fund. The fund will provide a three-year award for professional development for up to two mid-career, tenured professors within the College of Engineering and Computational Sciences.

**S. Bruce** '60 and **Eleanor Heister** committed \$150,000 in support for the Guy T. McBride Jr. Honors Program in Public Affairs.

**Patrick M.** '68 and **Sharon L. James** made gifts of \$256,725 in support for the Heritage Lounge in the Starzer Welcome Center and for the Leslie S. James Memorial Endowed Scholarship Fund.

**Harold M.** '68 and **Patricia M. Korell** contributed \$151,909 as a challenge match for The Parents Fund to help increase participation from parents.

**Franklin J.** and **H. Darlene Stermole** committed gifts totaling \$523,315 in support for the Clear Creek Athletics Complex, Men's and Women's Soccer, and Economics and Business.

**J. Don Thorson** '55 made gifts totaling \$100,843 to support the Leadership Summit.

A bequest distribution of \$826,000 from the estate of **John G. Underwood** '53 will provide unrestricted support for Mines.

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

**Donna S.** '97 and **Larry W. Anderson** contributed \$25,000 in support for the Earth Education Endowment Fund, Geology Educational Excellence Fund, Geology Field Camp Support Fund, Fred F. Meissner Memorial Fund and the Applied Mathematics and Statistics Department Fund.

**Robert J. Candito** '78 made a gift of \$50,000 to establish the Robert J. Candito Endowed Scholarship Fund, which will support undergraduate and graduate students.

**Charles J. Canepa** made a gift of \$26,327 to establish the CSM Golf Team Scholarship Fund — a current-use scholarship fund for students playing varsity golf.

**Stanley** and **Judy Rose Dempsey** made a gift of \$25,000 in support for the Stanley and Judy Dempsey Endowed Scholarship Fund, the Geology Educational Excellence Fund and Arthur Lakes Library.

**Bruce E.** '76 and **Debra K. Grewcock** made a gift of \$25,000 in support for the Bruce E. Grewcock Current-Use Scholarship Fund.

**Lam Research** made a contribution of \$25,000 to support research in the Chemical and Biological Engineering Department.

**Cordelia R. McBride** contributed \$25,000 in support for the Guy T. McBride Jr. Honors Program in Public Affairs.

**Geraldine D. Piper** made a gift of \$25,000 in support for the Robert G. and Geraldine D. Piper Endowed Scholarship Fund.

**Ward** '84 and **Karen Polzin** committed \$25,000 in support for The Mines Fund.

**Fred C.** '68 and **Sue Schulte** made a gift of \$51,125 in support for the Fred C. Schulte Endowment for the McBride Honors Program.

**Charles E.** '61 and **Louanne Shultz** contributed \$47,190 in ongoing support for Colorado School of Mines.

**Thomas C. Snedeker** '36 made an additional life income gift of \$100,000.

**Michael R.** '83 and **Patricia K.** '83 **Starzer** contributed \$30,000 to The Parents Fund.

**Mike** '94, PhD '97 and **Missy Stoner** contributed \$25,000 in support for the Billy J. Mitchell American Driller Scholarship Fund.

**F. David Jr.** '87 and **Beverly Zanetel** contributed \$55,000 in support for the Clear Creek Athletics Complex.

### MINES CENTURY SOCIETY

**Extraordinary contributors whose lifetime gifts to Mines total \$100,000 or more.**

**DIAMOND LEVEL: \$5,000,000-\$9,999,999**

**Moved members:**

Harold M. '68 and Patricia M. Korell  
Michael R. '83 and Patricia K. '83 Starzer

**SILVER LEVEL: \$500,000-\$999,999**

**New members:**

Adam '95, MS '00 and Jamie Sayers

**Moved members:**

Vernon A "Bud" Jr. '64 and Kaye Isaacs  
Patrick M. '68 and Sharon L. James

**COPPER LEVEL: \$100,000-\$499,999**

**New members:**

David W. '80 and Nancy Baker  
Bill H. Combs  
Will '82 and Rhonda Duey  
John F. '52 and Evon Fox  
Gordon L. '50 and Jean Gray  
John H. Gray '64  
Keith A. '52 and Mary Ann Kvenvolden  
Joanne Lerud-Heck and Thomas Heck  
Javan '80 and Julie '80 Ottoson  
Louis C. '42 and Helen M. Pakiser  
Edwin W. Jr. '54 and Sue Peiker  
Richard L. '55 and Patricia Stallings  
Mike '94, PhD '97 and Missy Stoner  
Harry V. Jr. '69 and Rosalyn I.R. '69 Temple  
Barth E. '79, MS '82 and M. Maureen Whitham

1978

**Vincent M. De Bonis** is a national marketing manager for Schlumberger Oilfield Services and lives in Katy, TX.

**Mark A. DePuy** is acting CEO for Venoco in Denver, CO.

**Andrew P. Swiger** is a senior VP and principal financial officer for ExxonMobil and lives in Dallas, TX.

**Douglas Woodul** 

1979

**Stephen R. Bergin** is director of reservoir engineering for Atlas Pipeline and lives in Tulsa, OK.

**John F. Gnazzo** is an application development consultant for Superior Consulting and lives in Eden Prairie, MN.

**George Jackson** 

**Leslie V. Penello** works for Risked Revenue Energy Associates and lives in Houston, TX.

**John B. Roucis** is a senior staff research scientist for Chevron and lives in Hercules, CA.

**Lawrence T. Shade** is operations manager for Chemtrade Logistics in Augusta, GA.

**Martin D. Wittstrom Jr.** is president and CEO of Oil and Gas Investments Group in Houston, TX.

1980

**Theodore R. DePooter** is principal of Jacobs Associates based in San Francisco, CA and lives in Pacific, MO.

**Owen Dull** 

**Robert W. Hessek** is a senior structural engineer for Western Engineering and Research and lives in Denver, CO.

**Philip O. Johnson** is VP of drilling for Seidel Technologies in Denver, CO.

**Edward J. Naylor** works for BHP Billiton and lives in Pflugerville, TX.

**Brian Rothkopf** became an Austrian citizen and now has dual citizenship with the U.S.

**Richard P. Smiley** is VP of operations for CL&F in Houston, TX.

**Patrick G. Smyth** is a district account manager for Nalco Champion and lives in Torrance, CA.



**WELCOME!** Michael R. and Patricia K. Starzer, 1983 Mines graduates, stand with President Bill Scoggins in front of a beam for the new Starzer Welcome Center during a site dedication ceremony held on Aug. 26, 2014. The Starzers made a \$4 million commitment to support the building that is currently under construction at 19th and Illinois streets. The center is expected to open in 2015.



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**UNVEILED IN VAIL** Lacy Taylor '10 and Travers Boughdady '10, MS '12 were married November 24, 2012, in Vail, Colo. Crystal Mapes '10; Andrea Casias '10, MS '13; and Anthony McDaniels '07 were in the wedding party.



**GROWING FAMILY**

Tara Schwein '10 married Lyle Bauman at All Soul's Catholic Church in Englewood, Colo., on July 2, 2011. They now have two sons: Thomas was born May 23, 2012, and Dominic—their most recent addition to the family—was born August 17, 2013.

**WII BELONG TOGETHER**

Michelle Reynolds '12 and Jason Norris were married March 14, 2014 (Pi Day!), in Wheat Ridge, Colo. Michelle works for Water Conveyance Group, which is a part of the Technical Service Center in the Bureau



of Reclamation. Jason works for Chapel Hill Mortuaries and Cemeteries in Centennial, Colo. Their Nintendo-themed wedding featured hand-sewn Nintendo controller ties, a Mario-themed cake and hand-stitched fire flower power bouquets with matching boutonnieres. Guests enjoyed homemade food, Wii games and dancing. "We walked down the aisle to 'Mario Kart Love Song,'" Michelle says. "We had a 'first game' instead of a first dance — Tetris-style! The traditional daddy-daughter dance was with Mario Kart Wii." The wedding party included Maureen O'Brien '12, Rachel (Knuckles) Phillips '11 and Cindy (Allshouse) Fitzsimons '11. Other Mines alumni in attendance were Jordan Johnson '12, David Pride '12, Desi (Tan) Naibauer '11, Haley Jewell '14, Amy Shaw '13, Ryan Hild '11, Robyn Chaconas '13, Ben Moskovitz (current student), Lexi Salazar '14 and Kristin Rivard '13.



**THANK YOU FOR PARTICIPATING IN SENIOR GIFT!**

Combined with matching funds from Mines Board of Trustees Member Tim Haddon '70 and President Scoggins, **you and the Class of 2014 raised \$16,065 for The Mines Fund, your academic departments and other important areas on campus.** Your investment in Mines as students, and now as alumni, keeps Mines mighty!



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**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. When you visit, if you take a few moments to enter your latest information and upload some photos, we'll list your name here in the next issue. For online viewing instructions, click on Class Notes at minesmagazine.com.

**1981**

Ann E. Hanson  
Robin E.G. Hesketh  
Mark J. Ludwig  
Gary R. Pekarek  
Glenn M. Vangolen  
James H. Weber  
David R. White

**1982**

Barbara L. Ganong  
John T. Hadley  
Mark H. Nilsson  
William J. Pincus

**1983**

Charles W. Baker  
Daniel J. Berberick  
Richard D. Griffis  
Darcy L. Jordan  
Holly Rhoads Lindsey

Roxanne Skeene   
Michael R. Starzer

**1984**

Douglas O. Buckland  
David Dorrance  
Daniel E. Elvera  
Dennis M. Gallagher  
Anya M. Gill  
Simone E. Gutberlet  
John M. Kirkpatrick  
Mark B. Mathisen  
Joseph Nelson   
David C. Raymes  
Brett D. Smith  
R. Scott Tracy  
Ronald W. VanZandt

**1985**

Jeffrey R. Anderson  
Thomas C. Anderson

Mark A. Erickson  
Kirk L. Ketcherside  
John A. Lambuth  
Brian J. Smith  
Michael V. Strain

**1986**

Michael O. Bower  
William W. Fleckenstein  
S. Scott Gutberlet  
J. Glen Honstein  
Oscar E. Orihuela  
Donna M. Reeve  
Michael P. Riendeau  
Jeffrey M. Wilson  
Pamela J. Woods  
William D. Yearous

**1987**

Clay L. Hoes

J. Scott Kimbrough  
Gerhard J. Plenert  
Richard J. Reuter  
W. Alan Sawyer Jr.  
Vance L. Scott  
Steven C. Wood

**1988**

Lotfi Ben Rached  
Darryl J. Colvin  
Robert E. Farrar  
Andrea J. Gallagher  
Mark B. Kuettel  
Timothy P. Lane  
James Y. Lee  
Gary J. Lundberg  
Gregory S. Palinckx  
David W. Sobernheim  
Desiree A. Weygandt

**1989**

Eric M. Gopsill  
Gerald B. Konst  
James D. Lane  
Richard J. Schepis  
Steven D. Sparkowich  
Michael J. Young 

**1990**

John H. Fronczak  
David C. Lawler  
Henry C. Nowak

**1991**

Grzegorz Dewicki  
Richard C. Ginder  
John G. Green Jr.  
James Ruble III   
Mark L. Schroeder  
John J. Tanigawa  
Trey White

**1992**

Scott A. Fournier  
Victoria B. Jackson  
Nielsen  
Michael A. Rynearson  
Blaine K. Spies  
Denise M. Thomas

**1993**

Gerald S. Grishaber  
Julia C. Gwaltney  
Danielle L. Reader

**1994**

Felipe Azocar H.  
Christian H. Ericksen  
Todd C. Kenyon  
Catherine C. Simmons  
Margareta K. Wenman

**1995**

Michael T. Dickinson  
Mark A. Erickson  
Daniel W. Shupp  
Brad A. Woodard

**1996**

Edward A. Adkins  
Montgomery P. Blair  
Fernando A. Cerda  
Jennifer R. Heist  
Matthew R. Kent  
Robin L. Schott  
Robert D. Scott  
Lance D. Waddell  
Fabiola N. Williams

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STANDING, LEFT TO RIGHT

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

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

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

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

SEATED

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

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

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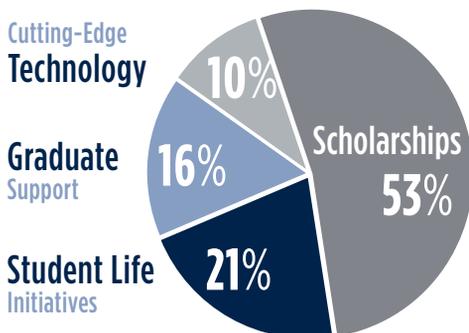
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## ANNIVERSARY CHALLENGE

# CELEBRATING 140 YEARS OF EXCELLENCE!

To honor Mines' 140 years of excellence, members of the Colorado School of Mines Foundation Board of Governors, Marshall Crouch '67 and Rob McKee '68, and their wives, Jane and Ann, are generously offering to match the personal portion of your President's Council-level gift to The Mines Fund, dollar for dollar, up to \$15,000.

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1997

Nathan A. Bennett  
 Erik A. Close  
 Antonio J. Miller  
 Mark E. Slusser  
 Kyle B. Townsend  
 Christy A. Troxel  
 Derek T. Webb  
 Elizabeth J. Young-Dohe

1998

Samuel J. Anderson  
 Emily A. Chastain  
 Letitia B. Knott  
 Nathan J. Kruse  
 Ronald R. LePlatt Jr.  
 Xaysana Saycocie  
 Robert M. Schulz  
 Narisara Thongboonchoo  
 Anthony E. Vigil

1999

Nathan D. Corlett  
 Aragorn L. Earls  
 David B. Graham  
 Daniel J. Grunwald  
 Kirill M. Merkulov

Kenneth S. Sportsman  
 Gilein Steensma

2000

Christopher M. Kelso  
 Tricia D. Kletke  
 Daniel J. Larkin IV  
 Christophe G.P. Ponsart  
 Richard A. Rail  
 Michael S. Watkins

2001

Ibrahim S. Al-Kharusi  
 Daniel S. Baker  
 David A. Bixler II  
 John M. McLaughlin  
 Rachel H. Newell  
 Christopher Reidinger

2002

Anibal Araya  
 Nicholas Barrett  
 Ross E. Boone  
 John-Paul DeBauge  
 Brandon L. Desh  
 Eric Dillenbeck  
 Matthew S. Griego  
 Travis J. Johansen  
 Curtis Perry

Ian C. Schick  
 Ty J. Smith  
 Christine M. Traynor  
 Jeremy D. Zimmerman

2003

Eric E. Baca  
 Christopher L. Bremer  
 Orison J. Bullard IV  
 Justin Carlson  
 Jessica L. Marlow  
 Patrick C. McGaugh  
 Christopher S. Nocks  
 Guillermo Dante Ramirez  
 Marc T. Rood  
 Andrew T. Zwickl

2004

Mark A. Glass  
 Jennifer M. Gminski  
 Nathan R. Hedrick  
 Jeffrey C. Huynh  
 Mark Montano  
 Ellen N. Simmons  
 Teresa K. Spann  
 Jason A. Valdez

2005

Emily C. Allen

Albert C. Brown  
 Dene M. Clair  
 Brian D. Grade  
 Kristopher S. Hill  
 Heather E. Hoops  
 Kai M. Hudek  
 Geoffrey N. Johnson  
 Ian C. McEachern  
 Ryan W. Regier  
 Kelly L. Rhoades  
 Victor O. Salazar  
 Andrew P. Schmid  
 Jeffrey C. Ward  
 Colin M. Wein  
 Eric S. Williams

2006

David P. Greaves  
 Kevin D. Heersink  
 Bryan J. Jilka  
 Scott W. Kemler  
 Jennifer M. Livermore  
 Lisa K. McDowell  
 Kaitlyn M. McNaughton  
 Luke C. Riemenschneider  
 Stephanie A. Savage  
 Jeremy K. Sell  
 Wade W. Simmons  
 Nathan F. Skitt

Thomas A. Wagner  
 Angela Zamarron

2007

Amrut Athavale  
 Bryan M. Carruthers  
 Helena Chouinard  
 Babatunde I. Egunjobi  
 Jacob W. Kirkley  
 Peter P. Le  
 Carl D. Lundin  
 Michael McGlynn  
 Ayoub K. Semaan  
 Chelsea R. Weitzel

2008

Zachariah Joseph Ballard  
 Marco D. DelPiccolo  
 Diana C. Diaz  
 Robert Donley  
 Gregory D. Foster  
 Jason P. Foster  
 Emily G. (Milian) Gonzales  
 Adam M. Hanna  
 Christina McClard  
 April M. Nelson  
 Thomas L. Nenahlo  
 John Tonello

2009

Karoline J. Bohlen  
 Ryan J. Decker  
 Hilary S. Hoops  
 Drew R. Meyer  
 Matthew J. Nichols  
 Kenneth C. Nygaard  
 Brian T. Ramsey  
 Jacob E. Rundell  
 Adam J. Smiley  
 Yating Wang

2010

Nadiah Anasir  
 Ashley L. Begley  
 Thomas O. Begley  
 Travers A. Boughdadly  
 Jean Pierre Fodjouo  
 Michael D. Halsema Jr.  
 Christoph E. Hurley  
 Jeffrey A. Hutsell  
 Barrett A. Lavergne  
 Christopher B. Lee  
 Chad D. Lewis  
 Dana P. Martin  
 Stefano N. Raffo  
 J. Luke Richards  
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 Richard Z. Vidal

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Courtesy of PA2 Luke Clayton



**SECURE TECH** U.S. Coast Guard Lt. Cmdr. Eugene McGuinness MS '11 received the 2013 Systems Engineer of the Year award as part of the Department of Homeland Security's Honorary Program Management Awards. Winners were recognized during a ceremony held July 9, 2014, at the Homeland Security Acquisition Institute. McGuinness, who served as technical lead for the

implementation and integration effort for the Coast Guard's HC-144A Maritime Patrol Aircraft, "expertly managed funding constraints, customer needs and expectations while maintaining a balance of cost, schedule and performance throughout the HC-144A's life cycle."



**FRIENDS FIRST** Nika Muckelroy '08, MS '10 and Connor Moyer '08, MS '10 were married April 25, 2014, at The Manor House in Littleton, Colo. As freshmen, the couple met in their first EPICS class, had nearly the same class schedule for the next few semesters and became good friends. Eventually, they started dating after they completed graduate school at Mines and found jobs. Groomsmen were Cameron Moyer '06, Brandon Bard '08, Nathan Reitmeier '08 and Stephen Pronovost '08, MS '10. Other alumni who attended their wedding are Sean Babiniec '07, PhD '14, Samantha Choi '09, MS '10, Kim (Conner) Mills '06, PhD '14, Tara Davis '08, MS '10, Meg (Ryan) Gibbs '08, MS '11, Chris Lange '08, MS '11, Kathleen Gesterling '08, MS '09, Chris Meehan '08, MS '11, Courtney (Nowill) Pennington PhD '11, Ryan Pennington '06, MS '09, Lucas Simmons '08, MS '09 and Amanda Younessian '08.



**THREE IS NOT A CROWD** Mohammed J. MS '11, and Salma AlKhamis welcomed their third child, Reem. She was born October 12, 2013.



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**AIN'T NO MOUNTAIN HIGH ENOUGH** Emily Milian '08 and Vince Gonzales '05 were married August 23, 2014, at YMCA Camp Shady Brook in Deckers, Colo. Emily is the deputy director of the Colorado School of Mines Alumni Association. Vince is a patent examiner for the U.S. Patent and Trademark Office. Numerous Mines alumni joined their celebration and even hiked a mountain (no rocks or hardhats required) to witness the ceremony: Ryan C. Miller '06; Andy McAliley '05; Amy Goodson '09; Renee Ranguet '08, MS '09; Heather (Oertli) '10 and Matt Bergren '09; Sydney (Laws) '10 and Ben Zywicki '11; Whitney (Rice) '08 and Larry McDaris '07; Scott Harrison '06, MS '07; Nate Skitt '06; Cache Dillon Hamm '07; Michelle Harman (current student); James Dimagiba MS '06 and Mines Assistant Professor Steve DeCaluwe.

Andrew S. Wait  
Donna C. Willette

**2011**

Ashleigh A. Cutt  
Jonathan P. Harrelson  
Sidra Hussain  
Katherine C. Hyland  
Michael J. Kasberg  
Charum K. Kolong  
Vasilisa V. Nekhorosheva  
Jared R. Shanks  
Hilary N. Stamp

**2012**

Stephanie K. Biagiotti  
Timothy M. Brueggeman  
Laura A. Garchar  
William R. Garrett  
Gerald Hua  
Zachary C. Keller  
Michael M. Lea  
Kirtland I. McKenna  
Kimberly N. Mizenko  
Alison P. Oien  
Kelly M. Ramirez  
Brittney A. Ransome  
Blake M. Short  
Michael C. Strabala

Lorae L. M. Tracy  
Alex J. Turner  
Christina M. Volpi

**2013**

Lauren K. Aberle  
Robert J. Broman  
Zeng Chen  
Russell E. Drummond  
Elliot T. Feng  
Steven A. Freytag  
Rachel I. Gelman  
David P. Gilmour  
Marshall H. Hall  
Nathan K. Harvey  
Mitchell H. Holstege  
Brett J. Kilbourne  
Benjamin V. Kronholm  
Paul T. Martin  
Neal P. Matosky  
Kelsi T. Nervik  
Megan Oller  
Daniel L. Palmer  
Andrew I. Shaw  
Kyle J. Tivnan  
Kyle J. Wallace  
Joseph T. Watterson

**2014**

Matthew D. Arreola  
Steven T. Barton  
Austin R. Cain  
Nathaniel J. Caroe  
Katharine A. Courtright  
Catherine J. Crossman  
Norman Blain Engblom  
Jonon Gantumur  
Levi S. Gerber  
Alexander R. Gonzalez  
Gabriel D. Gusey  
Jessica M. Ho  
Robert B. Hunton  
Sarah V. Kelly  
Nicole L. Kennedy  
Erin K. Keogh  
Patrick O. McPadden  
Marielle P. Mercurio  
Lianne R. Nelsen  
Benjamin Nyarko  
Matthew J. Smith  
Dylan C. Stiles  
Jordan J. Tansiongco  
Mallory J. Wick  
Andrew J. Yanke



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**CHEMICAL ATTRACTION** Ashleigh Warntjes '11 and Christopher Cutt '11 were married June 14, 2014, at the Chatfield Botanic Gardens in Littleton, Colo. Chris proposed in 2012 along Clear Creek after they enjoyed another delicious D'Deli lunch in Golden. The couple lives in Minneapolis, Minn., where Ashleigh is a physician assistant and Chris is a process engineer. The groom's brother, Matthew Cutt '14, was in the wedding party. Mines alumni in attendance were Tyler Rust '11, Erin Anthony '12 and Gracie (Bernard) Wilson '12.



**SMALL TOWN BLISS** Christopher Reidinger '01 married Kalene Weinholdt on July 26, 2014, in Meeker, Colo. Christopher is an electrical engineer at White River Electric Association. Kalene, a 2006 alumna from the University of Northern Colorado is an accountant at Taxtime Inc. The couple lives in Meeker.



**AN EPIC WEDDING** Corey Wible '12 and Marshall Hall '13 were married June 12, 2014, in Broomfield, Colo. They met in EPICS I class in 2010 and have been inseparable since.

**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 [magazine@mines.edu](mailto:magazine@mines.edu).



PDC Energy is a highly successful independent energy company engaged in the development, production, and marketing of natural gas and oil. Founded in 1969, PDC Energy's business focus is in the Wattenberg Field in Colorado as well as the Utica Shale play in Ohio and the Marcellus Shale in West Virginia. If you are interested in joining our team please visit our website for a full list of career opportunities.

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- Pumpers

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**HR@PDCE.COM**

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Farmer Palette, Yuma, CO. Evan Anderman

## ALUMNUS PROFILE

# Geology and Aerial Photography Create Artistic Commentary

In 7th grade, Evan Anderman MS '93, PhD '96 developed an interest in landscape photography. He was outdoorsy but also scientifically minded—his young brain was attracted to the technical side of the craft. But it would be decades before his creative, geology-informed aerial photography would win awards and be recognized by Colorado media outlets.

Anderman, a Denver native, left Colorado only to attend Phillips Exeter Academy and then Princeton University. He returned after graduation with a degree in geology and worked in consulting for a few years while taking a part-time photography class on the side. He then decided to pursue graduate school at Mines, where he studied geological engineering.

After a series of consulting gigs, first with Wright Water Engineers in Denver, then with the USGS writing computer-modeling code for a group developing a regional scale model of the Yucca Mountain site (that was released as several packages for the MODFLOW program), Anderman took a job with the groundwater hydrology firm McDonald Morrissey Associates.

At around the same time, Anderman's father died. He had been a petroleum geologist and operated a small, independent oil and gas company. After selling his father's domestic and Russian assets, Anderman decided it was time to get out from behind a computer screen and back into nature. He officially left his desk job and became a photographer full time.

He refers to his style as social-landscape photography. Anderman, a pilot, captures the beauty of the earth by shooting out the window of his plane while flying on autopilot. An Arctic



cruise served as one of the pivotal points for his current airborne approach.

"We disembarked in Iceland and I rented an airplane—I wanted to shoot from the air. It was a two-hour flight and I got some incredible shots," including one that hangs on the wall of his Denver studio showing the metallic braid of an Icelandic river slicing through a mountain range. That photo was awarded the inaugural Photo District News Duggal Image Maker Award at the PhotoPlus Expo in New York in 2013.

Since that first inspirational flight he has traveled the globe, but his favorite subject

is Colorado's eastern plains—an area he used to explore in his youth.

"At first, you think it's flat, it's brown, it's bland—and then your eyes shift down and you start seeing stuff like this," he said, pointing out the color and pattern variations of a farmer's terracing as seen from above. "It's gorgeous ... Decay is not the story happening out there. It's a vibrant community of people doing interesting things."

The series of photographs, called "Imposition," illustrates how man imposes himself on the landscape. From agricultural development and feedlots, to oil and gas exploration and drilling platforms, Anderman's birds-eye view shows man's impact on the land.

"I hope I can spark a conversation," he said.

—Karen Gilbert

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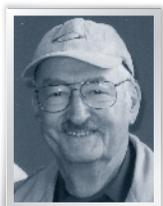
[www.ulteig.com/careers](http://www.ulteig.com/careers)



# 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



**ALFRED H. BALCH** DSc '64 of Golden, Colo., died May 23, 2014. Born in 1928, he graduated from Stanford with a bachelor's degree in geology in 1950. After a three-year stint in

the U.S. Navy during the Korean War, he began his professional career in the oil industry with Phillips Petroleum, and returned to graduate school at Mines to receive his doctorate in geophysical engineering.

From 1970–1974, he was an adjunct professor of geophysics at Mines. After a career as a research geophysicist in oil exploration with the U.S. Geological survey Branch of Oil and Gas Resources, with Mobil Research and Development and with Cities Service, he returned to Mines in 1986 as a research professor and retired in 1998 to pursue his love of the Colorado outdoors—bicycling and skiing. He helped bring a Little League organization to Littleton, Colo., where he also coached several soccer teams. An Eagle Scout himself, he was active with the local Boy Scouts.

Al was awarded a Fulbright Professorship to lecture and teach at Moscow State University. He was a recipient of the Hagedoorn Award of the European Association of Exploration Geophysicists, served as a national officer of the Society of Exploration Geophysicists and authored one of the pioneering textbooks on vertical seismic profiling. At the invitation of the U.S. Geological Survey, he established a seismic stratigraphic research group within the organization during the 1980s. A former member of the President's Council at Mines, Alfred holds two U.S. patents and several foreign patents.

He is survived by his wife of 61 years, Manie; children, Susan Clapham, Alfred Balch Jr. and Christopher Balch; and nine grandchildren.



**DONALD A. BEATTIE** MS '58 of St. Johns, Fla., died August 22, 2014. Born in 1929, he served as a carrier pilot in the U.S. Navy from 1951–1956. He returned to graduate

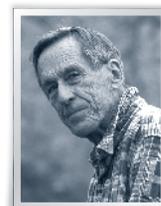
school at Mines and received a master's degree in geology. Mobil Oil hired him to supervise a geology field party, mapping the large Mobil concessions in little-known jungle and rainforest regions of Colombia, South America. In 1963, NASA hired him to help plan lunar surface experiments for Apollo and post-Apollo missions. He was with NASA for 10 years, until the close of the Apollo program in 1973. Don then was appointed director of the advanced energy research and technology division for the National Science Foundation.

In 1975, he became deputy assistant administrator for solar, geothermal and advanced energy systems for the Energy Research and Development Administration. Subsequently, he was appointed assistant secretary (acting) for conservation and solar applications for the Department of Energy.

Don returned to NASA from 1978–1983 as division director of the energy systems division, and then became vice president of Houston operations for BDM International. After running a consulting business, he served as president from 1991–1996 for Endosat Inc.

A former member of the President's Council at Mines, Donald wrote many articles published in scientific journals and three books.

He was predeceased by his siblings Tom Beattie and Margaret Berger. He is survived by his wife of 41 years, Ann; sons, Tom and Bruce; and two grandsons.



**RAMON EDWARD BISQUE (RAY)** Ramon (Ray) Edward Bisque of Golden, Colo., died June 9, 2014. Born in Iron River, Mich., in 1931, he earned a bachelor's degree

from St. Norbert College, and a master's degree in chemistry and dual doctorates in chemistry and geology from Iowa State University. His distinguished 30-year stint at Mines began in 1959, where he headed the chemistry department for six years. In 1990, as Mines professor emeritus, he was awarded honorary membership in the CSM Alumni Association.

A fellow of the American Association for the Advancement of Science, he was a consultant for the Institute for Defense Analysis at the Pentagon from 1960 to 1963, and the Director for the Earth Science Curriculum Project (National Science Foundation) from 1965 to 1967.

On Valentine's Day 1964, Ray co-founded a mineral exploration company, Earth Sciences, Inc. (ESI), with his doctoral candidates, Duane N. Bloom PhD '64 and Douglas N. Stevens PhD '64, and continued as ESI Chairman of the Board for 42 years. In 2004, ESI was transformed into a “green company” by acquiring Advanced Emissions Solutions, Inc. (ADES). As ADES's chief scientist, Ray received several patents related to treating emissions from coal-fired power plants, and these inventions are used to reduce mercury and other pollutants in fifteen percent of all coal burned in the U.S. today. He continued inventing to his final day.

As a regularly published scientific author, Ray also self-published several books, including “Iron: A River, a Town, a County, a Mine, a Family,” “Lions of the Lyons” and his autobiography, “Unseen Cairns.”

He was predeceased by his sister, Dorothy. He is survived by his wife of 60 years, Marie; children Camille and Edward Ford '79, Stephen Bisque '83, Laura and R. Scott Tracy '84, Thomas, Daniel '89 and Matthew '90; and 15 grandchildren including Jenae Ford, current CSM Foundation employee, Sarah Bisque '10, Lorae Tracy '12, and current Mines students Evan Ford '15 and Stephen Tracy '17.



**ALEX CHISHOLM** '57 of Hibbing, Minn., died May 22, 2013. Born in 1930, he earned his professional degree in mining engineering from Mines. That same year, he married Mary

Ellen, and he and his newlywed moved to Pittsburgh, where he worked for Dravo Corp., managing a tunnel project that set up the city's first sewer system. In 1961, he joined his father-in-law in Hibbing as the third full-time employee for L&M Radiator. Eleven years later, he moved his family to Australia to establish a manufacturing plant. Eventually, the company established plants in Mexico, Canada, South Africa and Chile.

In 1975, he was named Minnesota Small Businessman of the Year. From 1975–1981, presidents Ford and Carter appointed him to the U.S. Presidential Advisory Committee for Trade Negotiations. In 2000, the Hibbing Chamber of Commerce awarded him its Lifetime Achievement Award. At Mines, Alex was a member of the President's Council for several years.

He is survived by his dearest friend, Frances J. Gardeski; his sister, Mary Louise Meredith; his children, Dan Chisholm and Laura Ekholm; eight grandchildren and one great-grandchild; and Fran's family, including children, Ed, Julie, Mark and Janie, and their six children.



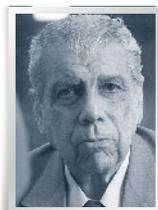
**JAMES E. CURZON** '53 of Tulsa, Okla., died March 18, 2014. Born in 1930, he married his high school sweetheart, Vera Roush, in 1952, and earned his professional degree

in petroleum engineering from Mines, where he was a member of Beta Theta

Pi fraternity. After serving with the U.S. Army in Missouri and Korea, Jim began his career as a petroleum engineer with Phillips Petroleum. In Texas, New Mexico, Kansas and Oklahoma, he worked in reservoir production, unitization, development and enhanced-oil recovery, before he advanced to major product management in the North Sea area. His 32-year career concluded in Norway, where he served as the director of waterflood and subsidence projects.

Jim was a member of the Society of Petroleum Engineers. A dedicated scoutmaster, he saw his two sons and four grandsons achieve the rank of Eagle Scout.

He was predeceased by his parents, Eugene C. '23 and Allene Curzon. He is survived by his wife of 61 years, Vera; brother, Eugene Curzon; sons, Thomas and John Curzon; and four grandsons.



**ANTONIO ERMIRIO DE MORAES** '49 of Sao Paulo, Brazil, died August 24, 2014.

Born in Sao Paulo in 1928, he was one of the most admired entrepreneurs in Brazil. After receiving his professional degree in metallurgical engineering from Mines, Antonio joined the family-owned Grupo Votorantim. The operation, founded by his grandfather in 1918 with the purchase of a textile factory, was administered by his father, Jose Ermirio de Moraes '21. For decades, Antonio was the CEO and chairman of Grupo Votorantim, which is now the nation's biggest cement maker and has interests in aluminum, pulp and paper, energy, agriculture and finance. The company does business in more than 20 countries and is Latin America's fifth-largest diversified industrial conglomerate. In 2005, the IMD Business School and Lombard Odier Darier Hentsch Bank recognized Grupo Votorantim as the world's best family company.

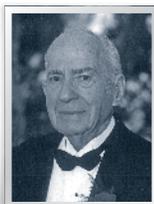
Antonio sponsored the creation and was the president of the Sao Paulo-based Beneficencia Portuguesa Hospital, where he reportedly visited the ER without warning to ensure its prompt attendance to patients. He helped turn the hospital, which provides 60 percent of its services to citizens below the poverty line, into one of

the largest and most advanced hospital complexes in Latin America.

During his career, Antonio had direct political involvement with campaigns to promote democracy, the improvement of the national health system and the generation of job opportunities. In 2012, he was decorated with the Bandeirantes Medal, the highest honor awarded by the state of Sao Paulo to its citizens. He frequently published articles in national newspapers and magazines and is a member of the Academia Paulista de Letras. In 2013, his life was portrayed by sociologist Jose Pastore in a biography titled "Ermirio Antonio de Moraes: Memoirs of a Private Diary." De Moraes also wrote three plays—"Brazil SA," "SOS Brazil" and "Wake Up, Brazil!"

A member of the Mines Century Society and the President's Council, Antonio was also a life member of the alumni association. In 1974, Mines presented him with its Distinguished Achievement Medal. Later, he received an honorary doctorate of engineering degree from Mines.

Antonio was predeceased by a brother, Jose E. de Moraes '48, and two sons, Carlos '79 and Mario Ermirio de Moraes '86. He is survived by his wife, Maria Regina Costa, with whom he had nine children, including sons Antonio '81 and Luis '82; and 17 grandchildren.



**GILBERT FABRE** '47

of Boise, Idaho, died November 9, 2013.

Born in 1915, Gil saved money for college—and to fulfill his sense of adventure—by

working as a prospector, surveyor, crew chief and radio operator in the Alaskan wilderness. One winter, he lived in a log cabin near the Arctic Circle.

Gil volunteered for the Army Air Forces after Pearl Harbor and married Helen Schoppe in 1943. Following World War II, he earned a geological engineering degree from Mines and moved to Texas, where he worked as a petroleum geologist for Magnolia Petroleum Co. He retired from Mobil Oil in 1984.

Gil's hobbies were camping, backpacking, designing and making his own tents and backpacks, wood carving, cooking, hunting, fishing and canoeing. His life of adventure continued well

into his 90s, most often with his children and grandchildren.

He was predeceased by his wife, Helen. He is survived by his children, Carl Fabre, Vivian Hervey, Joyce Fabre and James Fabre; four grandchildren; and one great-granddaughter.

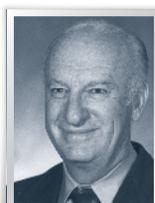


**ROLAND B. FISCHER** '42 of Lafayette, Colo., died December 3, 2013. Born in 1920, he received his metallurgical engineering degree from Mines,

where he was a member of Tau Beta Pi honor society. After graduation, he served four years in the U.S. Army during World War II and then became a research engineer at the Battelle Memorial Institute in Ohio. In 1963, he joined Dow Chemical Company's Rocky Flats division near Golden, Colo. Fourteen years later he became a senior research metallurgist for Rockwell International, where he retired in 1983 as a senior research specialist.

He authored numerous articles and holds several patents on metals and making atomic bombs safer for the handlers. Roland was a member of the American Institute of Mining, Metallurgical and Petroleum Engineers and the American Metals Society. He was a member of the Colorado School of Mines Alumni Association's History Committee and served often on its Reunion Planning Committee. In 1996, CSMAA recognized him with an honorary membership. He was a jewelry craftsman, ice skater, skier, fisherman and outdoorsman.

Roland was predeceased by his wife of 66 years, Betty Herman. He is survived by his children, Randall Fisher and Carol Fischer; two granddaughters; and three great-grandchildren.



**PHIL H. GARRISON** '39 of Golden, Colo., died February 18, 2009. A native of Golden, Phil was born in 1917 and received his geological engineering degree from Mines, where he

was a member of Sigma Alpha Epsilon fraternity. After graduation, he went to work for Amoco Production Company, where he spent his entire career. When he retired in 1977, he was an explora-

tion manager for Amoco in Denver. Phil continued his work into retirement, spending five more years with Champlin Oil.

He was a member of the Mines Heritage Society and a member of the President's Council for many years, and served on CSMAA's board of directors from 1966-1969.

He was predeceased by his son, Phil Garrison; his wife, Alene, died in 2012. He is survived by their children, Patricia Drake, Michael Garrison '66 and Chandra "Sharon" Roehrs; seven grandchildren; and two great-grandchildren.



**VINCENT J. HAMILTON** MS '90 of Geneva, Switzerland, died March 10, 2014. Born in 1963, he received his bachelor's degree from Northern Arizona University in

1986, and then his master's degree in geology from Mines.

Vince was a geologist for Shell USA in Houston from 1989-1991 and then for Eurocan until 1994, when he became president of Canadian Industrial Minerals. He and his wife, Mona, migrated to London to work for Sands Petroleum, and then in 1995, moved to Mona's homeland of Geneva. In 1999, he became president and director of Mart Resources Inc. Vince cofounded Tethys Oil in 2001 and was the company's chairman from its inception until 2013. Under his guidance, Tethys quickly became one of the largest onshore oil and gas concession holders in Oman.

He left the company to found, support and fund the medical research foundation Victory NET, whose purpose is to find new treatments for neuroendocrine tumors. An accomplished sport fisherman, Vince enjoyed traveling, cycling and partaking in winter sport activities with his family. He is survived by his wife, Mona; and children, Emma, Hugo and Oscar.



**STEPHEN P. KANIZAY** DSc '56 of Lakewood, Colo., died April 16, 2013. Born in 1924, he received his doctorate in geological engineering from Mines.

He served as a combat engineer during World War II, in which

he earned two Bronze Stars. Stephen retired from the U.S. Geological Survey.

He is survived by his wife, Freda; three sons; four grandchildren; and two great-grandchildren.



**THOMAS J. KNIGHT** '82 of Edmond, Okla., died August 24, 2014. Born in 1958, he earned his bachelor's degree in mining engineering from Mines, where he was

involved with Mines Little Theater. Beginning in 1982, he worked several years for Kerr McGee Corp. in Oklahoma and Illinois, in positions ranging from an associate engineer/mine engineer, mine engineer-development, assistant to the superintendent for the Kerr McGee Corp. and production foreman. He then worked for Abbottsfield/BP Alaska, before becoming a consultant for Hughes Brothers. He also served as secretary of the Oklahoma Mining Commission.

Tom is survived by his mother, Lenora Knight; wife, Kimberly; children, Ryan Knight and Stephanie Knight; and siblings, Denis Knight and Jaylene Park.



**STEVEN R. LINDBLOM** MS '97 of Arvada, Colo., died July 4, 2013. Born in 1964, he graduated from the University of Wyoming and earned a master's

degree in geological engineering from Mines. Steve was employed by S.S. Papadapolous and Associates as a hydrogeologist, followed by the Colorado Oil and Gas Conservation Commission. He was a member of the National Ground Water Association.

An outdoorsman, Steve loved hiking, hunting, camping and fishing. He is survived by his parents, Bob and Nancy Lindblom; his wife of 18 years, Leah Twine; brother, Scott Lindblom; and children, Keagan and Erik.



**ANTON G. PEGIS** of Golden, Colo., died May 15, 2014. Born in 1920, he served two years in the U.S. Army during World War II. Tony received a bachelor's degree

in 1949 from Western State College in Gunnison, Colo. He taught English at Fort Lewis College in Durango, Colo., and then moved to Denver, where he earned his master's degree and doctorate in English from the University of Denver. During a 28-year career at Mines, he taught English and philosophy and served for 10 years as its vice president. Fluent in Greek since childhood, Tony was adept at teaching English as a second language, receiving honors from his students as outstanding teacher. When he retired in 1982, he was named professor emeritus of English. The Mines Class of 1960 established a scholarship fund in his name, and Mines ROTC made him an honorary colonel in the 115th Engineer Regiment. Tony continued working as a technical writing consultant for federal agencies and private industries, and he taught technical writing and editing seminars until he fully retired in 2005.

Predeceased by his wife of 63 years, Harriet Stevens, Tony is survived by his sister, Polly Pease; daughters, Stefani De Bell and Penelope Pegis; a granddaughter; and a step-granddaughter.



**EDWIN W. PEIKER** '54 of Boulder, Colo., died June 3, 2013. Born in 1931, he graduated from Mines with his professional degree in geological engineering, where he was a member

of Sigma Alpha Epsilon fraternity. After a brief stint with Utah Construction as a geologist, Ed joined the U.S. Army in 1955, returned stateside in 1957 as an exploration chief for Republic Steel and then became an assistant professor in the engineering department at the University of Colorado in 1958, where he earned his bachelor's and master's degrees in civil engineering.

From 1966–1983, Ed held various positions at Climax Molybdenum. Subsequently, he became an independent consultant and a principal for Denver Mining Finance. From 1987–1988, he served as vice president

for Royal Gold, and as president and COO until 1992. On his many travels to China, he would take photographs with Polaroid film of the children and people he met and give them the photos as gifts. Polaroid made a commercial about his generosity. At Mines, Ed was a member of the President's Council for more than a decade.

He is survived by his wife, Sue; their children, Willie, Greg and Helen; and four grandchildren.

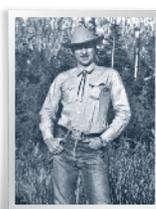


**WILLIAM H. PENNEY** '51 of Woodbury, Minn., died August 15, 2014. Born in 1929, Bill earned his professional degree in petroleum refining engineering from Mines. He received

his PhD in chemical engineering from the University of Minnesota in 1957.

A 31-year employee with 3M in St. Paul, Bill was involved in the development of the fiber material used in surgical face masks, surgical tape and oil spill-recovery products, as well as materials for playing surfaces. Heading up a team of chemists in the commercial chemical division, he participated in the development of Fluorel and ScotchGuard. Bill was also a member of the Advanced Research Project Agency, a federal government group that isolated new chemical compounds for nuclear testing at the Los Alamos Proving Grounds in New Mexico. After his retirement from 3M, Bill, an avid firearms collector and enthusiast, opened Bill's Gun Shop and Range—the largest shooting range in Minnesota—and Tactics Law Enforcement Supply.

He was predeceased by his wife of 59 years, Mabel Yarkie. He is survived by his children, Sue Penney, Kate Bromann, Tom Penney and Ellen Farrell; and six grandchildren.

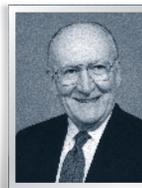


**RALPH EMERSON PRAY** DSc '66, of Claremont, Calif., died May 30, 2014. Born in 1926, he received his bachelor's degree in metallurgical engineering from the University of Alaska

in 1961 and his doctorate in metallurgical engineering from Mines. In 1968, he founded his own consulting business and was the owner and operator of the Mineral Research Laboratory in

California. Most of his career was spent investigating old mines and assaying mineral samples from the Mojave Desert and other parts of southern California. Ralph received numerous honors and awards for his work and served as historical consultant for the History Channel's "Gold Mines" in 2000. He published more than 100 essays and short stories, and wrote an historical fiction children's book, "Jingu, The Hidden Princess." He coached his children's basketball and baseball teams, spoke at civic organization events and volunteered with the Monrovia Police Department.

He is survived by his wife of 55 years, Beverley; children, Max, Ross, Leslie and Marlene; and three grandchildren.



**SAMUEL C. SANDUSKY** '48 of Findlay, Ohio, died February 24, 2013. Born in 1923, he earned his professional degree in petroleum engineering from Mines, after

serving in the U.S. Navy during World War II. Sam was president of the Mines chapter of Sigma Alpha Epsilon fraternity and was a member of Sigma Gamma Epsilon honor society. He lettered in baseball, rifle and boxing.

His career began at Ohio Oil Company (now Marathon), where he worked in multiple states and in various positions, including supervisor of engineering and contracts in the natural gas division, natural gas division manager and chief petroleum engineer. He retired in 1985. A master fly fisherman, Sam enjoyed rose gardening and playing golf. He was a member of the Heritage Society, President's Council and Reunion Giving Program (1997–1998) at Mines.

He is survived by his wife of 65 years, Dorothy; siblings, Craig Sandusky, Mary Lois Aspinwall and Margaret Wallace; and children, Sue Ann Sandusky and Timothy Sandusky.

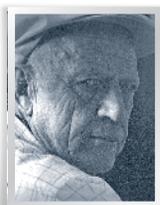


**GEOFFREY SLADE** '06 of Fruita, Colo., died January 11, 2014. Born in Denver in 1984, he participated in cross country at Fruita Monument High, where he graduated with honors. At Mines, he earned his bachelor's degree in engineering

with an electrical specialty. He was a member of the choir and Phi Gamma Delta fraternity, and was involved in the Humanitarian Engineering program.

Geoff began his career with Kiewit Western Co., where he was employed as a field engineer. During that time he worked as a mechanical, civil, structural, office and quality control engineer. Subsequently, he was hired by Xcel Energy, where he drew upon his electrical engineering background.

Geoff enjoyed mountain biking, rock climbing and ballroom dance. He is survived by his parents, Norman and Evelyn Slade; and brothers, Bryan and Scott.



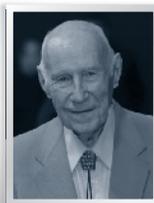
**JAMES C. TERNAHAN JR.** '51 of Grand Junction, Colo., died April 13, 2014. Born in 1924, he graduated in 1943 from the Curtiss-Wright Technical Institute, a profes-

sional trade school where Jim was trained in aeronautical engineering. For the next three years he served in the U.S. Army Air Corps during World War II.

From the time he received his professional degree from Mines in metallurgical engineering until 1960, Jim was an engineer and mine and construction superintendent for mining enterprises in Colorado, Utah, Wyoming and Montana. In the succeeding 18 years, he was with Varian Associates, one of the original high-tech firms in Silicon Valley, first as a process/production engineer, then as comptroller and senior financial analyst for a

Varian division. Until his retirement in 1999, he was engaged in real estate, insurance and property management. He was a member of the Society for Mining, Metallurgy and Exploration.

He was predeceased by his wife of 65 years, Laura, and his son, Paul. He is survived by his children, Patricia Ternahan, Kathleen Howlett, Michael Ternahan and Kristine Ducote; four grandchildren; and four great-grandchildren.



**LESTER G. TRUBY** '48 of Bayfield, Colo., died April 15, 2014. Born in 1923, Lester served as a first lieutenant during World War II, before earning his profes-

sional degree in petroleum engineering from Mines. He was a member of Kappa Sigma fraternity and Sigma Gamma Epsilon honor society.

After graduating, he worked for Humble Oil (now Exxon) on offshore drilling operations and reservoir engineering. In 1955, he joined Pacific Northwest Pipeline—which was bought by El Paso Natural Gas in 1960—where he became manager of production and drilling. El Paso Exploration hired him as vice president production and then promoted him in 1982 to senior vice president. The company was acquired by Burlington Resources, from where he retired in 1985.

Whenever he visited drilling rigs, one of his sons always would accompany him. As a result, all three of them became petroleum engineers. Lester was active in the alumni association section in El Paso and supported Mines

as a member of the Heritage Society and President's Council for more than a decade.

He enjoyed fishing, particularly on the Pine River. He is survived by his wife of 65 years, Kathleen Koeteew; sons, Charles Truby '75, Cynthia '83 and Russell Truby '79 and Scott Truby; four grandchildren, including current student Alexandria Truby.



**JERRY J. WARNER** '58 of Oxford, Miss., died August 11, 2014. Born in 1935, he earned his professional degree in geological engineering from Mines, where he

was a member of Sigma Alpha Epsilon fraternity and earned letters in football and track.

After graduation, Jerry married Nancy Priedeman and served as a first lieutenant in the Army Corps of Engineers. He then began his career in Illinois with a natural gas production and distribution company. Jerry worked in all phases of the natural gas industry, including exploration, gas processing and distribution.

An avid fisherman, he also enjoyed woodworking, golf and traveling. He spent 40 years in leadership roles with the Presbyterian Church organizations in Illinois and Mississippi. He is survived by his wife of 56 years, Nancy; brother, Don Warner '56, MS '61; children, Lee Warner, Michael Warner and Janice Warner Brown; and five grandchildren.

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

## ALSO REMEMBERED

|   |                    |                                    |                   |
|---|--------------------|------------------------------------|-------------------|
| <b>R.T. BROWN JR.</b> '54.....              | October 25, 2007   | <b>TIMOTHY M. RYDER</b> '57.....   | October 24, 2010  |
| <b>CRAIG S. BUTH</b> '80.....               | December 8, 2012   | <b>DELBERT F. SMITH</b> '38.....   | December 18, 2002 |
| <b>LAWRENCE J. CHOCKIE</b> '49, MS '50..... | August 5, 2011     | <b>GREGORY B. STANDER</b> '83..... | January 25, 2010  |
| <b>JAMES S. FALCONER</b> '69.....           | February 23, 2008  | <b>ROBERT B. STECK</b> '57.....    | August 6, 2013    |
| <b>RUSTAM H. IRANI</b> '52.....             | August 8, 2010     | <b>RALPH C. STITZER</b> '51.....   | May 13, 2014      |
| <b>BRIAN LABADIE</b> '66.....               | March 5, 2005      | <b>MILTON N. TOWBIN</b> '32.....   | May 2, 2003       |
| <b>SEBASTIAN MOLL JR.</b> '39.....          | unknown            | <b>FRANK W. VAUGHN</b> '51.....    | November 28, 2005 |
| <b>JAMES R. MOUNT JR.</b> '54.....          | September 19, 2009 | <b>JAMES E. WERNER</b> '36.....    | unknown           |
| <b>MINOO P. NETARWALA</b> '42.....          | unknown            |                                    |                   |

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**Value of scholarships  
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**Endowment funds  
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As of April 1, 2014

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**Ryan Bott**  
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**Number of  
scholarships granted:**

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**Value of scholarships  
awarded:**

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**Endowment funds  
raised:**

\$81,200

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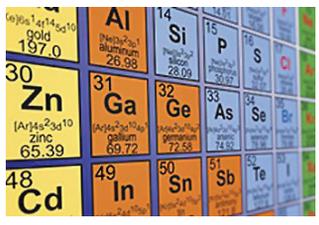
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# MINER'S PIC



Courtesy of Jesse Peters

## NO SLACKER HERE

Mickey Wilson '11, MS '12, is a professional slackliner from Durango, Colorado.

He first tried the sport was when he was a junior at Mines and soon after, he founded the CSM Slackline Club and gave the club its infamous nickname, the CSM Slackers.

While studying for his master's degree at Mines, Wilson went to his first slackline competition, the USA Nationals, and took second place. He has since competed internationally and walked highlines as high as 400 feet (over desert canyons, between high alpine cliffs, and over the Las Vegas Strip) and as long as 300

feet. He has walked many longlines over parks, prairies and bodies of water—the most memorable, he says, being the waterline over the Dubai Marina. His longest longline walk to date is 720 feet. Wilson is currently ranked 5th in the world rankings of tricklining.

Wilson was first sponsored by Gibbon Slacklines as a professional slackliner, but was recently offered the position of team captain/manager for the Slackline Industries Pro Slackline Team. He is also sponsored by Belong Designs, Concrete Coast Clothing and Dirty Dog Sunglasses.



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