

Diary of a Grand Canyon Excursion

Obama on Campus

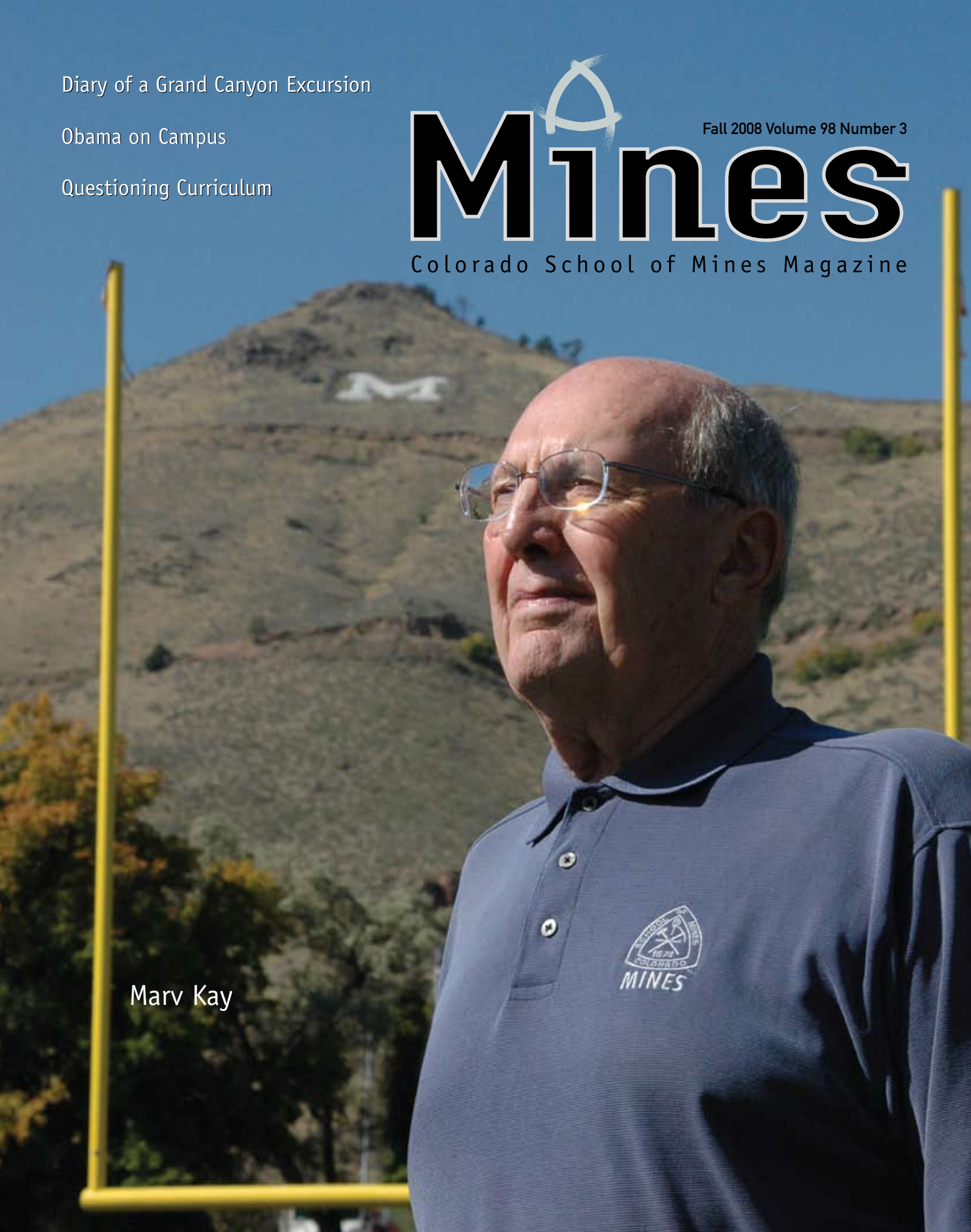
Questioning Curriculum

Fall 2008 Volume 98 Number 3

Mines

Colorado School of Mines Magazine

Marv Kay



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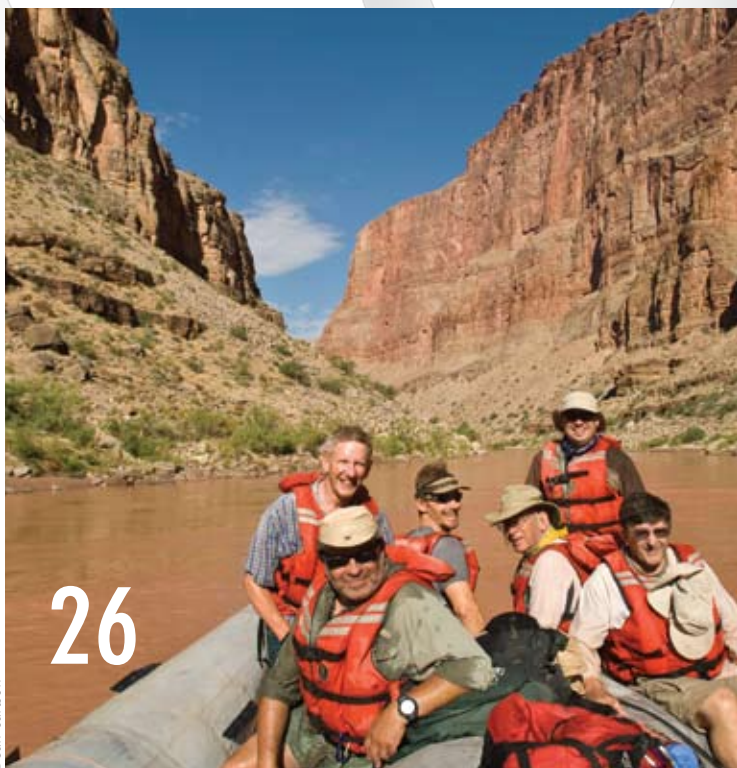
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Contents

Fall 2008



26

Dean Carlson



32

Nick Sutcliffe

Features

22 Marv Kay

Mines' Coach Kay was honored this year as the sole inductee into the school's Athletic Hall of Fame. Read about the life and legacy of this campus legend.

26 A Grand Adventure

Excerpts from Steve Sonnenberg's travel log kept during this summer's CSMAA Grand Canyon trip. It's about a breathtaking journey down 180 miles of the Colorado River; it's also a journey back in geologic time.

32 The Mines Curriculum

The Mines curriculum has changed. Just how significant are these changes? This story examines whether a Mines degree is any easier today than it used to be.

Departments

4 Inbox

5 Letter to Our Readers

6 Inside Mines

12 New Frontiers

14 Just Published

16 Investing in Mines

18 Scoreboard

20 Spotlight

36 The Network

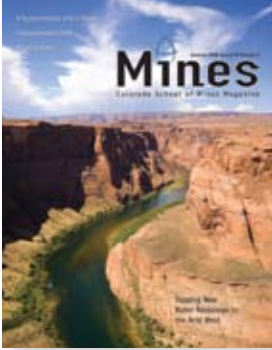
38 Fast Forward

Class Notes, Weddings,
Class of 2029, Passings

52 Last Word

53 At Your Service

Grand Curiosity



Mines magazine received several letters inquiring where the picture of the Colorado River featured on the cover of the summer issue was taken. The picture was obtained from Shutterstock, a stock photography website, and the only

information provided was “bend in the Colorado River.” We will endeavor to include as much detail as possible on photography featured in the magazine, and we appreciate the interest shown by readers.

The following is unrelated to Mines magazine, but we thought it would be of interest to readers. Laura is an alumna working in the oil and gas industry and living in Kuala Lumpur, Malaysia.

This morning, while following the U.S. vice presidential debates live via the New York Times website, I was terribly pleased to see CSM articulately represented in the “College Newspaper Editors Viewpoints.” The referenced, energy-focused points Mr. Aman posted reflects a serious, informed electorate, and I am proud to forward that article to my colleagues as a representation of my alma mater. Living as an expatriate in the energy industry for a large portion of the last six years, I’m extremely pleased to find CSM actively participating in the national discussion leading up to this November’s election.

Absolute kudos to whomever initiated and coordinated this participation, and a special thanks to Mr. Aman for his representation.

Cheers-

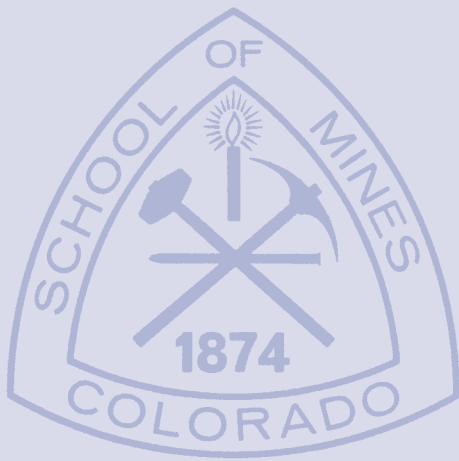
Laura Schafer '00, MS '02



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Comments and suggestions are welcome. Contact us by writing to *Mines* Magazine, P.O. Box 1410, Golden, CO 80402; or call 303-273-3294 or 800-446-9488, ext. 3294 between 8 a.m. and 5 p.m. M-F, MST; or email magazine@mines.edu.

Dear Readers,



Is anyone else wondering what happened to summer this year? It seems as though for many, these months were compressed into a flurry of frenzied activity. However, at least one group of lucky alumni was able to slow down. In this issue we are pleased to share a travel log that Steve Sonnenberg PhD '81 kept while leading the 2008 CSMAA Grand Canyon travel-study trip. "A Grand Adventure" is accompanied by some spectacular photography and tells the story of the trip, with some fascinating commentary on the geological history of the canyon.

As we ushered in another academic year, we pondered whether a Mines degree is as hard to earn today as it was in years gone by. Draw your own conclusion when reading the "The Mines Curriculum." This story takes a look at changes made over the years and includes arguments from diverse points of view.

Honored during Homecoming weekend with induction into the Mines Athletics Hall of Fame, the feature story about Marv Kay describes his lifelong connection to the school, his years of dedicated service and his accumulating legacy—a must read for all those who care strongly about Colorado School of Mines.

In *Inside Mines*, you can read about presidential candidate Barack Obama's visit to campus, which brought so much national and international attention to Mines. The school's increased involvement with NREL is also detailed in this section, as is an interesting "citizen science" project aimed at identifying hydrogen-producing algae species. Mines just received a grant of \$9.3 million from the NSF to research emerging renewable energy materials and technologies—read about this in *New Frontiers*.

Quite by coincidence, there are two nuclear energy-related articles in this issue. One is a profile of Mari Angeles Major-Sosias '85, MS '92, whose work as director of strategy for AREVA's North American operations could significantly shape future growth of nuclear energy in the U.S. The other is an essay in *Last Word* submitted by alumnus Newell Orr '54. He argues in favor of increasing the country's use of nuclear power.

I hope these last two items will spark some discussion. As always, we welcome the opportunity to publish your opinions about this or any other subject covered in the magazine. Please write or email to the contacts listed below.

Best wishes for the upcoming holiday season.

Nick Sutcliffe

Editor and Director of Communications, CSMAA

Campus News

Obama Campaign Rents Campus Facility

Presidential candidate Barack Obama spoke in Mines' Lockridge Arena on September 16 to a crowd of more than 2,000 people as part of an independent rally organized by the Obama Campaign.

The campaign rented the facility, arranged the logistics and distributed the majority of tickets on a first-come, first-served basis, although a number were set aside for the Mines community. After the school's tickets had been distributed through a campus-wide lottery, those who wanted to follow the proceedings but were unable to get in could watch a live video shown in the Green Center.

"Our students had a great opportunity today to engage in a national policy discussion on issues that will impact

their professional lives," said Nigel Middleton, provost and senior vice president for strategic enterprises. "The arrival of a presidential candidate on campus has stimulated the exchange of important ideas in a very positive way."

Obama came to campus the day after vice presidential candidate Sarah Palin spoke in Jefferson County. Palin reiterated many of the ideas included in her acceptance speech and spoke of her knowledge of the West and her belief in small government. Obama's speech focused on the regulation of financial markets and economic policy.

"We were in communication with the McCain Campaign about renting them the facility, but ultimately they



Joel M. Bach, Thin Air Images



selected a different venue,” said Marsha Williams, who heads up the school’s Public Relations office.

Following the event, President Bill Scoggins wrote to the campus community: “We were given a tremendous opportunity to promote Colorado School of Mines, and we should all be proud of the results. Next time it may be the other political party that elevates this school’s recognition in the world, and we welcome that prospect.”

Enlisting High School Students in Quest for H₂ Producing Algae

In an effort to involve high school students in the quest for alternative sources of energy, Mines PhD candidate Jonathan Meuser helped develop the Lunchbox Lab—a portable box equipped with the tools necessary to determine if various algae strains produce hydrogen.

“Algae have enormous potential for turning water and sunlight into fuel much more efficiently than food crops and without competing for the same land, water or nutrients,” says Meuser. Using the Lunchbox Lab, small teams of high school students can test individual strains of algae for hydrogen production and input their results on a project website. “Thus, high school students could become engaged in real science and contribute directly to the scientific community,” Meuser points out.

The lab works by sensing hydrogen production stimulated by light. It consists of glass beakers, an LED light source and airtight stoppers outfitted with chemochromic hydrogen sensors that were developed at the National Renewable Energy Laboratory, where Meuser once worked as an intern.

When algae are injected into the beakers, the stoppers are put in place and the beaker is exposed to light. Upon light exposure, some algae strains begin to produce hydrogen, which turns the chemochromic sensors

blue. The pressure sensor can be used to control the amount of light the algae are exposed to, thus allowing for comparisons between experimental conditions. The lab is equipped to test up to seven strains of algae at a time.

Currently, the Lunchbox Lab is on exhibit at various art galleries and museums. These exhibits have raised curiosity in this teaching and research instrument and, according to Meuser, “There has been tremendous interest on the part of students and high school teachers.”

Meuser designed and built the lab with the help of Amy Franceschini and Michael Swain of Futurefarmers, a San Francisco-based art collective. While there are no plans yet for mass production of the Lunchbox Lab, Meuser said they are looking for sponsors to help take the project further.

Getting the broader community involved in a shared scientific project, an approach dubbed “citizen science”, has great potential. “The use of citizen science networks often allows scientists to accomplish research objectives more feasibly than would otherwise be possible,” says Franceschini. “These

projects aim to promote public engagement with the research, as well as with science in general.”

Citizen science using the Lunchbox Lab would be especially useful in the search for hydrogen producing algae because there are literally thousands of strains that have not yet been tested for hydrogen production. And only particular strains produce hydrogen; the photobiological process requires a specific enzyme that interrupts the photosynthetic reaction, isolating hydrogen before it is bound to carbon.

As large as the task may seem, testing algae for hydrogen production is important because hydrogen is a promising renewable fuel option. “The task of carefully testing each algae strain for its unique abilities is an enormous undertaking,” said Meuser, who believes this project could be the key to advancing a critical line of scientific inquiry.





New AVP for Advancement Named

The CSM Foundation recently welcomed J. David Mays as assistant vice president for university advancement. Mays has been involved in charitable estate planning for more than 17 years, with experience at Colorado State University, the College of William and Mary, the University of Wyoming and Northern Arizona University. He earned his bachelor's degree from Wake Forest University and holds a J.D. from the University of North Carolina at Chapel Hill School of Law.

Geobiology—Changing the Face of Geology

In June, Mines hosted “The Energetics of Life,” a geobiology symposium, that included presentations by six geobiologists who shared their knowledge about microbial life and survival in extreme environments. The public symposium drew more than 175 participants from institutions along the Front Range including the National Renewable Energy Laboratory, University of Colorado, the U.S. Geological Survey, University of Wyoming and Mines.

The symposium was a part of the International Geobiology Course, a month-long summer course that focuses on the interactions between microorganisms and the environment and examines the imprints left from microbial life in the rock record. Now in its sixth year, the course is sponsored by Mines, the Agouon Institute and the National Science Foundation. Twenty students are selected to participate every year from an applicant pool of more than 75.

Students meet at the University of Southern California before heading out on a week-long working field trip. Led by John Spear, assistant professor of environmental



science and engineering at Mines, this year's trip took the group to Yellowstone National Park where students and instructors collected samples such as mud, sediment and microbial mat (pond scum) to be examined in the lab.

After the field trip, students accompanied Spear to Mines to analyze the samples in the molecular

microbial ecology lab. Students learned how to extract DNA from the samples and sequence one gene of specific interest—the 16S rRNA gene. Every living organism has this specific gene, although it is slightly different in each species, making it a useful marker for identification. The group's next stop was the Wrigley Center for Environmental Studies on Catalina Island, CA, where the focus was on metagenomics, the analysis of microbial DNA extracted directly from organisms collected from nature.

“Metagenomics will change the face of modern biology. Not only does it tell us about the evolution of life, but it will also reveal new insights into human medicine, crime investigation and forensics,” said Spear. Scientists and researchers are just beginning to understand the importance of geobiology and how interactions between microorganisms and the environment shape the evolution of the earth. And according to Spear, “Geobiology is the changing face of geology. We now realize that a lot of geologic processes from oil formation to weathering have a huge biologic component.”

Spear will co-direct the International Geobiology Course next year and Mines will host another symposium in June 2009.

Mines Joins NREL's Management Board

Mines will soon be represented on the National Renewable Energy Laboratory's management board, following the Department of Energy's announcement that it had selected the Alliance for Sustainable Energy to manage the lab. In addition to Mines, the ASE board governing NREL will include representatives from the University of Colorado at Boulder, Colorado State University, MIT and Stanford.

ASE is a limited partnership owned and operated equally by the Midwest Research Institute and Battelle, the two non-profit organizations that have managed NREL jointly for the past 10 years. The three Front Range universities are all members of the Colorado Renewable Energy Collaboratory, which also includes NREL.

"One of the strengths of ASE's proposal is the deepening of NREL's connections with the Colorado research and business communities," said John Poate, vice president for research and technology transfer at Mines. "Colorado is going to see

new outreach and new investments from NREL and ASE that will generate real economic—and academic—benefits."

Among other objectives, ASE's winning proposal outlined the following goals for NREL:

- Driving market-relevant technology innovations by partnering with industry, academic and governmental researchers across the nation and around the world.
- Accelerating commercialization and deployment through new business strategies and partnership arrangements to rapidly move revolutionary innovations from concept to consumer.
- Serving as the definitive source of objective analysis on renewable energy for the DOE and the private sector to accelerate achievement of national energy goals.
- Creating the Campus of the Future with facilities and infrastructure that showcase sustainable energy on the NREL site and in nearby partnering facilities.



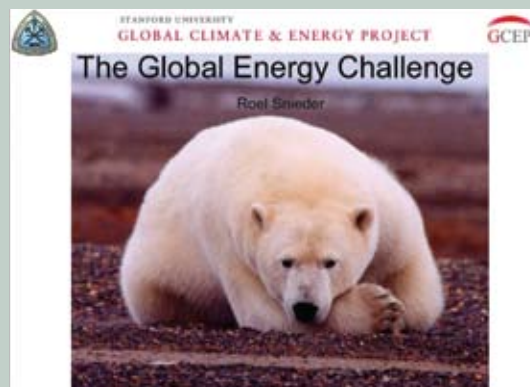
Energy Education Lecture Targets General Public

In an effort to educate the general public about the country's energy challenges, Mines geophysics professor Roel Snieder developed "The Global Energy Challenge," an informational public lecture focused on energy issues and the opportunities associated with the energy industry.

According to Snieder, the presentation "sketches the tension between increased energy demand, peak oil, the associated challenge in curbing climate change, and actions that we can take towards a sustainable energy system."

The lecture, presented at least 30 times since its debut in January, has been well-received by audiences ranging from K-12 to college students, and community members in service organizations such as Rotary clubs. Snieder developed the presentation while working for the Global Climate and Energy Project at Stanford University.

"The presentation gives ideas for positive action that teachers, students, businessmen, consumers and citizens can take to deal



with our energy challenges and turn them into opportunities," said Snieder. He noted that much action can be taken now to deal with energy challenges; and public engagement and education will aid in the effort to develop and implement an effective plan. "We tend to respond with technological fixes to challenges. And technology is indeed important, but behavioral changes are an integral part of rising to meet the energy challenge," Snieder said.

Snieder begins the lecture by explaining three of the major energy challenges that

face the world today. He covers worldwide energy consumption, energy sources, and controlling carbon dioxide emissions associated with the use of hydrocarbons. "Whether peak oil production occurs one year from now, or 10 years from now, or 30 years from now—we need to prepare for it," said Snieder.

Snieder's presentation is freely available for download at www.mines.edu/~rsnieder/Global_Energy.html.

Mines at the DNC

Mines was visible during at least two events held in Denver during the Democratic National Convention in August. The Green Frontier Fest, held outdoors August 24 in the Sculpture Park of the Denver Performing Arts Complex, celebrated healthy and green living. It showcased everything from major renewable energy technologies to everyday products and services.

Mines admissions and graduate school staff manned a booth among the fest's interactive and educational exhibits, farmers market, children's area, eco-carnival games, music, entertainment and special presentations.

Additionally, Mines was invited to attend the Sustainability in the Rockies Fair hosted by CH2M Hill at INVESCO Field at Mile High on August 25. The event focused on issues and solutions that both private and public institutions are pursuing in support of building sustainable communities. People from municipalities around the world participated, and performer Willie Nelson provided entertainment.

John Poate, Bob Siegrist, Tony Dean, Dag Nummedal, Tissa Illangasekare and Peter Han attended and answered questions regarding the school's research and education programs in energy and water. Mines has enjoyed a strong partnership with CH2M Hill. Ralph Peterson, chairman and chief executive officer of CH2M Hill, received an honorary doctor of engineering from Mines in 2000 and has served on the Mines Advisory Board for the past five years.



Top: Colorado School of Mines' table at the Green Frontier Festival held during the DNC. Bottom: Colorado Gov. Bill Ritter meets with Tony Dean, professor of chemical engineering and another guest at a reception sponsored by CH2M Hill during the Sustainability Fair, held during the DNC.

In Brief...

Graduate student **Jackson Lee** was awarded the Dorothy Bertine Internship. The annual award provides a one-time \$10,000 stipend to the most outstanding applicant to the Edna Bailey Sussman Fund.

Paul Martin, Professor in the Department of Mathematical and Computer Sciences, gave the Institute of Mathematics and its Applications (IMA) Lighthill Lecture in April. The annual lecture commemorates Sir James Lighthill who was the founding president of the IMA. Lighthill also organized the first British Applied Mathematics Colloquium in 1959, and this year's lecture was a part of the Colloquium's 50th anniversary.

Steve Hill, adjunct associate professor of geophysics, was elected president of the Society of Exploration Geophysicists.

John Speer, professor of metallurgical and materials engineering and a member of the Steel Center, joined the Office of Research and Technology Transfer starting September 1. Speer, who will spend 30 percent of his time as associate vice president for research, will assist in overseeing the development and implementation of research policies and procedures, and work with the Research Management Council, the Research Council, and the Technology Transfer Advisory Board.

American Iron & Steel Institute, and Association for Iron & Steel Technology Foundation's "Ferrous Metallurgy Education Today" awarded a Design Grant for the academic year 2008-2009 to a team of Mines metallurgical and mechanical engineering students and their professor, **Kip Findley**, for their proposal titled "Weldability, Processing, Microstructure and Fracture Toughness Relationships in Advanced High Strength Steel." Their proposal was submitted in response to the design theme "Technologies for Welding of New Generation Steels." The maximum allowable time for the project is one year beginning in the fall of 2008. The maximum grant per award will be \$50,000.



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Critical Minerals and the U.S. Economy

In 1924, indium was a scientific curiosity and merely a single isolated gram of it had been collected worldwide. Eighty-four years later, with the skyrocketing popularity of flat screens and the pending promise of its photovoltaic applications, indium ranks among the economy's most critical minerals, according to a report entitled *Minerals, Critical Minerals, and the U.S. Economy* sponsored by the National Academy of Sciences and underwritten by the Department of the Interior.

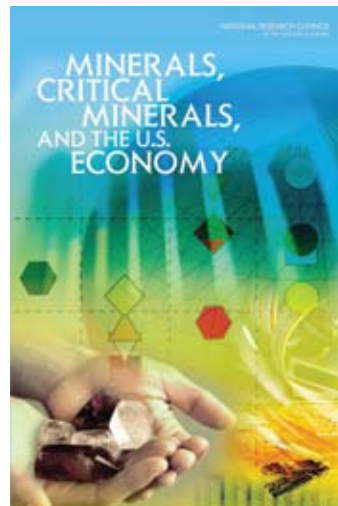
Reclaimed mainly from zinc ores and concentrates, the USGS reports global indium production was 510 metric tons last year, and prices spiked as high as \$980 per kilogram the year before, when production was actually higher. Indium tin oxide, used for thin-film coatings on flat panel screens, consumes more than half of the world's indium production. A decade-long demand spike, coupled with potential supply restrictions, landed indium with a designation of critical in the report, which was generated by a committee of academic, industry and government representatives chaired by Rod Eggert, professor and director of the Division of Economics and Business at Mines.

The report suggests a framework for assessing whether meeting anticipated industrial demand for a given mineral is under threat. To illustrate their recommendations, they only selected a handful of minerals from the estimated 25,000 pounds per person, per year of new minerals associated with supporting our modern way of life in the United States.

"What the committee tried to do is clarify and sort through the various issues that often get jumbled together and confused when it comes to critical minerals and the economy," said Eggert. Eleven minerals were chosen to illustrate the committee's method. Numerous factors were considered, including a mineral's concentration in small areas, single-country production, by-product production and the likelihood for rapid increases in demand.

Indium, Eggert explains, provided an example of high demand and limited sourcing. Upping the ante, the next generation of photovoltaic cells might use the rare, silvery-white metal. "If it takes off, it could represent a level of demand that is comparable to flat panels," Eggert said. Further complicating the picture, indium is obtained as a by-product of zinc mining and processing. "What's available for recovery is determined largely by the price of zinc...whether it's worth recovering is determined largely by the price of indium," Eggert says.

Exemplified by case studies like indium, the critical minerals report recommends the federal government invest in collect-



ing information about the entire life cycle of a mineral, from undeveloped geologic information, to potentially recoverable elements and minerals from products at the end of their lifecycle. "That includes assessing to what degree we might use

municipal waste dumps as the mines of the future," Eggert says.

It's basic research, and "a public good that is likely to be underprovided by the market itself," Eggert says. "We propose a framework or a method for assessing a mineral's degree of criticality. We suggest a role for the federal government in that evaluation."

NSF Funds Renewable Energy Materials Research Center at Mines with \$9.3 Million

Colorado School of Mines has been awarded \$9.3 million by the National Science Foundation to establish a new center that will focus on investigating emerging renewable energy materials and technologies. Mines' award was part of a larger grant totaling \$16.5 million, with the remaining \$7.2 million going to the University of Colorado to expand work on its existing Liquid Crystals Research Center. The funds, which will be awarded over a six year period, are from the NSF's Materials Research Science and Engineering Center program.

At an awards ceremony on September 22 at the State Capitol, Gov. Ritter said, "These grants will help us address the enormous energy challenges that face our state, our country and our planet." The Mines team, to be led by physics professor Craig Taylor, will be the first NSF-funded research center dedicated solely to renewable energy. Working in close collaboration with NREL, the center will focus on three areas that Taylor describes as "the most important scientific and engineering problems in the renewable energy arena."

The first problem concerns novel materials that have the potential to provide more efficient, less expensive photovoltaic devices. Much of the analysis will be conducted at the nanoscale, with experiments focusing on engineering particles that optimize the conversion of solar radiation into electrical current. Computa-



A ceremony was held at the Capitol marking this large award from the NSF. From left: Mines President Bill Scoggins; Tom Furtak, dept. head & prof., physics; Reuben Collins, prof., physics; Craig Taylor, prof., physics & MRSEC director; David Ginley, NREL; Andy Herring, assoc. prof., chemical engineering

tional simulation and characterization will support experimental approaches in the lab.

The center will also investigate novel membranes that could lower the cost and increase the lifetime of devices such as fuel cells. Advancements in fuel cell membranes could facilitate both the production of hydrogen as a fuel and the production of electricity using hydrogen as a fuel. Currently, membranes are a weak link in these technologies. One strategy will involve combining materials with dramatically different transport characteristics.

The third area of research concerns solids whose crystalline structures contain large open cages capable of storing concentrated quantities of gas molecules—such as hydrogen and methane. Two materials that fall into this class include clathrate hydrates, essentially composed of water molecules, and a special form of silicon that is non-toxic and potentially abundant.

The center will also conduct educational and outreach activities aimed at exposing students to renewable energy concepts at a young age. These efforts will include expanding an existing K-12 outreach program to include components that teach renewable energy concepts; developing a summer program that provides undergraduates with research experience in renewable energy technologies; and creating a renewable energy elective course sequence for graduate students.

In addition to the close collaboration with NREL, it is expected that more than a dozen private companies actively involved in alternative energy technologies will partner with the center. And scientists at Mines plan to work in parallel with researchers at the University of New South Wales, and Imperial College, University of London.

The \$9.3 million will be distributed over six years. The Colorado Higher Education Competitive Research Authority played a key role in securing this grant by providing the state matching funds required to compete for this major federal grant. With the state's match and support from the Colorado School of Mines, the center's annual budget will be well over \$2 million per year. Other institutions that received similar NSF grants this year include Harvard, Princeton and MIT.

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RISK ASSESSMENT
in Geotechnical Engineering



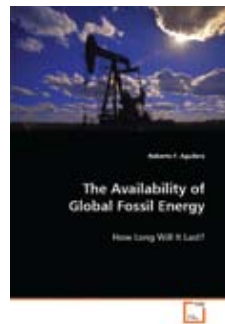
Risk Assessment in Geotechnical Engineering

Soils and rocks in their natural state are among the most variable of all engineering materials, and geotechnical engineers must often “make do” with materials that present themselves at a particular site. This makes geotechnical engineering highly amenable to a probabilistic treatment. A new text co-authored by Vaughan Griffiths, professor of civil engineering at Mines, and Gordon Fenton, a professor at Dalhousie University in Nova Scotia, describes the use of probabilistic methods applied to geotechnical engineering applications. *Risk Assessment in Geotechnical Engineering* details methodologies in which soil properties are characterized statistically, to generate a “probability of failure” or “reliability.” When these values are weighted by the consequences of failure, engineers can then assess the “risk” associated with a given design. Specific examples might involve the probability of slope failure in an embankment dam or unacceptable foundation settlement under a nuclear power plant. Risk assessment is a rapidly growing field of interest, not only for academics and practitioners, but also the insurance industry. (John Wiley & Sons, New Jersey, 2008)

Adaptive Pitch Control of Variable-Speed Wind Turbines

In a paper written by Kathryn Johnson, assistant professor of electrical engineering, and Lee Jay Fingersh, a senior engineer with NREL, the efficiency of advanced control systems in wind turbines is discussed. One of the goals of wind

turbine research is to obtain more electrical energy without increasing the cost of the wind turbine. If more energy is produced for the same turbine cost, the cost of energy from wind will decrease, allowing utilities to pass along savings to consumers. This research paper describes a method that has been shown in computer simulations and on a real wind turbine to increase the amount of power generated using relatively inexpensive control systems that adapt the pitch of the blade based on a variety of factors, including dynamic data on wind velocity and the speed of rotation. (*Journal of Solar Energy Engineering*, Vol. 130, No. 3, pp. 031012-1 – 031012-7)



The Availability of Global Fossil Energy

Roberto F. Aguilera PhD '06 recently published *The Availability of Global Fossil Energy* which focuses on concern in the energy industry about an approaching global crisis caused by peak oil production. It assesses the threat that depletion poses by estimating cumulative supply curves for conventional and unconventional petroleum resources. The results indicate that large quantities are available and can be produced at costs substantially below current market oil prices. These findings suggest that fossil energy is likely to last far longer

than many are now predicting and that depletion need not drive market prices above the relatively high levels prevailing over the past several years. Currently, Aguilera is a program officer and research scholar with the International Institute for Applied Systems Analysis. (VDM Publishing House, 2008).

Inverse Problems

Inverse problems are a common mathematical challenge in fields such as geophysics, astrophysics and medical imaging, which involve recovering an image or set of parameters from indirect “noisy” observations. For example, non-intrusive imaging is used to detect anomalies in the brain. But, how significant are the features a doctor may observe in an image? The characterization of solution uncertainty is an essential aspect of the study of inverse problems. In recent years, the development of computational technology has combined with advances in statistical methods to create unprecedented opportunities to understand and explore the role of uncertainty in inversion. Luis Tenorio, associate professor of mathematical and computer sciences, organized a special section of the journal *Inverse Problems* to expose the inverse problems community to some of the latest statistical and computational methods that are important for inverse problems. (*Inverse Problems*, Guest Eds. L. Tenorio, E Haber, W. W. Symes, P. B. Stark, D. Cox and O. Ghattas. 24:3, June 2008)



Earthquake Decision-Making and Response

ShakeMap is a well-established tool used to portray the extent of potentially damaging shaking following an earthquake. ShakeCast, also known as ShakeMap Broadcast, is a freely available and fully automated system capable of triggering established post-earthquake response protocols that was recently covered in *Earthquake Spectra* and featured on its cover. ShakeCast was developed by a team of four that was led by David Wald, an adjunct associate professor of geophysics and a supervisory research geophysicist for the USGS’s National Earthquake Information Center based on campus. The product was designed for emergency response, loss estimation and improving the availability of information to the public after an earthquake. ShakeCast compares a quake’s complex shaking distribution with the damageability of a user’s properties, providing simple hierarchical information on structures or facilities most likely impacted by an event. For example, the California Department of Transportation relies on ShakeCast for prioritizing inspections on their 12,000 or so bridges after an earthquake. (“ShakeCast: Automating and Improving the Use of ShakeMap for Post-Earthquake Decision-Making and Response,” D. J. Wald, K. Lin, K. Porter, and L. Turner, *Earthquake Spectra*, 24:2, 533-553. <http://earthquake.usgs.gov/shakecast/>.)

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Investing in Mines

An investment in knowledge always pays the best interest.

—Benjamin Franklin

Rising to the Marquez Challenge

Contributions surpass \$20 million for Marquez Hall

When Tim '80 and Bernie Marquez pledged \$10 million in 2005 toward construction of a state-of-the-art petroleum engineering building, they made Mines history with the largest individual contribution ever made to the school. To magnify the impact of their gift, the Marquezes challenged Mines to match their \$10 million with gifts from other individual, corporate and foundation donors.

Mines' philanthropic partners have contributed generously to meet the Marquez match, and more than \$20 million has now been invested toward construction of Marquez Hall. While groundbreaking is planned for next summer, an additional \$5 million is required to complete the first \$25-million phase of the building.

Since the last Marquez Hall project update featured in the spring 2008 edition of *Mines* magazine, Colorado School of Mines has received the generous commitments listed above:

Mahir M. Jalili '71 estate	\$1,529,000
Chevron Corporation	\$1,000,000
Marathon Oil Corporation	\$1,000,000
Anadarko Petroleum Corporation	\$500,000
Devon Energy Corporation	\$500,000
Questar Corporation	\$400,000
Bud '64 and Kaye Isaacs	\$250,000
Ward Petroleum Corporation	\$100,000
Will Fleckenstein '86, MS '88, PhD '00	\$50,000



Chevron: From left: Terry Young, geophysics department head; Eve Sprunt, Chevron university partnership & recruitment manager; Robert Ryan, Chevron vice president, global exploration; Ramona Graves, petroleum engineering interim department head; Mines President Bill Scoggins; John Humphrey, geology & geological engineering department head



Anadarko: From left: Ramona Graves, petroleum engineering interim department head; Bob Daniels '85, Anadarko senior vice president, worldwide exploration; Jim Kleckner '81, Anadarko vice president of the Rocky Mountain region; Mines President Bill Scoggins; John Humphrey, geology & geological engineering department head



Devon Energy: From left: Don DeCarlo, Devon Energy vice president and general manager, Western region Elizabeth Costello, Devon Energy campus recruiting coordinator Ramona Graves, petroleum engineering interim department head; Mines President Bill Scoggins

Chevron contributes \$1,245,000 to Mines; Other Recent Gifts

Colorado School of Mines recently received nine large gifts:

Harry D. Campbell '42 continued his support of Marquez Hall and the Harry D. Campbell Endowed Scholarship Fund with gifts totaling \$361,179.

Chevron contributed gifts totaling \$1,245,000 to support the Chevron Education Center for Study of the Earth in Marquez Hall; a partnership between Mines and the Kazak National Technical University; earth science and engineering-related educational events and programs; and an integrated program in basin modeling.

ConocoPhillips contributed \$250,000 to support the ConocoPhillips SPIRIT Scholars Program, SUM-MET (Summer Minority Engineering Training Program), several academic departments and student organizations, geoscience fellowships and the McBride Honors Program.

The Henry Luce Foundation contributed \$114,313 to support the Clare Boothe Luce Professorship.

Questar Corporation contributed \$134,000 toward their \$400,000 pledge to the Marquez Hall building project.

Tom Snedeker '36 continued his support for Mines' Petroleum Engineering Department with gifts totaling \$130,000 to fund three charitable gift annuities.

Frank and Dot Stermole made gifts totaling almost \$1 million for a charitable gift annuity in continued support of athletics at Mines.

The William and Flora Hewlett Foundation contributed \$278,500 in support of their \$1,167,000 pledge for the Engineering Schools of the West Initiative.

The Xcel Energy Foundation contributed \$300,000 toward the Colorado Clean Energy & Environment Project at CERI (Colorado Energy Research Institute).

Other recent gifts over \$25,000 from individuals, corporations and foundations:

The Adolph Coors Foundation contributed \$75,000 to support the Adolph Coors Foundation Scholarships.

Marshall C. III '67 and **Jane Crouch** made a \$25,000 pledge payment toward their \$250,000 commitment to Marquez Hall.

The Edna Bailey Sussman Fund contributed \$60,400 in continued support of environmental internships for Mines students.

EnCana Oil & Gas (USA) Inc. contributed \$35,000 to support students in the Department of Geology and Geological Engineering.

ExxonMobil contributed \$25,000 to the Mathematical Association of America's regional meeting.

Hershal C., Jr. '58 and **Judy Ferguson** gave \$25,000 to establish the Ferguson Athletic Scholarship Fund, which will provide scholarships to undergraduate students who participate in varsity sports at Mines. This year marked Hershal's 50th class reunion.

William W. Fleckenstein '86, MS '88, PhD '00 contributed \$50,000 to Marquez Hall.

Joe W. '68 and **Jane E. Gray** gave \$25,000 in honor of Joe's 40th reunion.

Hanna Oil & Gas Company contributed \$25,000 to establish an endowed scholarship fund in memory of Joe Thompson '59.

HP awarded an HP Technology for Teaching cash and product package grant valued at \$92,000.

Claudia E. Jacobus, a friend of Mines and widow of the late Carl L. Hiltrop, and **Ellen J. Bondurant '75** established the Dr. Carl L. Hiltrop Memorial Scholarship Fund with a gift of \$26,500, to support students studying chemistry and geochemistry while participating in a varsity or club sport.

Patrick M. '68 and **Sharon James** made a \$25,000 gift to establish the Leslie S. James Memorial Endowed Scholarship Fund to honor the life and achievements of Pat's father.

Ben E. Mares '73 made gifts totaling \$27,620 in support of athletics programs, including softball and women's basketball, at Mines.

Robert E. III '68 and **Ann McKee** contributed \$25,382 in continued support of the McKee Family Scholarship Fund.

Charlie McNeil '71 gave \$25,000 in continued support of the Student Recreation Center.

The Mikkelson Foundation contributed \$33,000 to the Engineering and Applied Technology Program.

James B. Mollison '58 made a \$50,000 gift in honor of his 50th reunion to support field trips and field camp for students in the Department of Geology and Geological Engineering.

Phuriphan Phirakijksul, friend of the school, contributed \$30,000 to support the Department of Chemistry and Geochemistry at Mines.

Robert G. Piper '49 contributed \$27,404 in continued support of the Robert G. and Geraldine D. Piper Endowed Scholarship Fund

Denice Volk Reich established an endowed scholarship fund in honor of her parents, Russell H. '26, MS '31 and Alice Volk, with a \$25,000 gift.

Rio Tinto contributed \$40,000 toward the Rio Tinto Scholarship Fund.

Charles E. '61 and **Louanne Shultz** continued their support of the Shultz Athletic Scholarship Endowment Fund with a \$51,885 gift.

St. Mary Land & Exploration Company contributed \$25,000 toward their \$125,000 pledge to the Marquez Hall building project.

Alice M. Tolen made a \$50,000 contribution in continued support of the Delbert F. Tolen Scholarship Fund.

The acknowledgements listed quarterly in Mines magazine recognize single gifts of \$25,000 and greater. Over the course of the fiscal year ending June 30, 2008, the following individuals gave multiple gifts that totaled \$25,000 or more:

William J. and Louise K. Barrett

Edmund R. Blakeman '51

Lawrence '49 and Rose Curtis

Stan and Judy Dempsey

Hugh W. '49 and Ann Evans

J. William II '70 and Carolyn J. Fishback

Lorenz '56 and Luanna Goetz

David M. Grimes

Harold M. '68 and Patricia M. Korell

M. W. and Karen G. Scoggins

Michael R. '83 and Patricia K. '83 Starzer

Andrew P. '78 and Sherry Swiger

Jody L. '01 and Adrienne Trantham

Warren L. '62 and Ada B. Wright

Varela Inducted into RMAC Hall of Fame



Varela (right) receives the RMAC award

On Saturday evening, July 12, 2008, former CSM men's basketball player Raul Varela '96 was inducted into the Rocky Mountain Athletic Conference (RMAC) Hall of Fame during the seventh annual RMAC Hall of Fame Banquet at the Cheyenne Mountain Resort in Colorado Springs, CO.

Varela, who played at Mines from 1992-93 to 1995-96, was inducted into the CSM Athletics Hall of Fame in 2003. Selected as the RMAC Men's Basketball Player of the Year as a senior in 1995-96, Varela was a three-time All-American selection during his collegiate career. Varela averaged 24.1 points, 3.0 assists and 2.9 rebounds per game during his career at CSM. Varela became the fourth representative from Colorado School of Mines enshrined into the RMAC Hall of Fame, joining Lloyd Madden '41

(2003), Fritz Brennecke, (2004) and Bruce Allison (2006).

The all-time leading career scorer in the history of the Colorado School of Mines men's basketball program (2,551 points), Varela garnered First Team All-RMAC laurels as a freshman, sophomore and senior. A Second Team All-RMAC pick following his junior campaign, Varela started all 106 games in which he appeared for the Orediggers. During his sophomore season in 1993-94, Varela averaged 26.1 points per game to finish 11th in the nation in scoring. Varela graduated from Mines with a degree in mechanical engineering.

"RMAC schools regularly compete at the national level in numerous sports, and I am humbled to be inducted into the 2008 class of the RMAC Hall of Fame," said Varela. "It is a great honor."

Varela currently works as the manager of corporate investments and hedging activities in the Corporate Treasury Group at OppenheimerFunds, Inc. Varela and his wife, former CSM women's basketball player Jodi Noone '97, reside in Arvada with their daughters, Dane (4) and Teya (2).

Oredigger News & Notes...

- The Orediggers have hired Katie Simons as their new Assistant Sports Information Director.
- During the summer of 2008, the RMAC announced that men's and women's swimming & diving will officially become conference sports in 2008-09.
- A grand total of 40 Mines student-athletes earned Academic All-RMAC recognition in the spring of 2008 (three in golf, five in baseball, eight in softball, 24 in outdoor track & field).
- For complete schedules, rosters, results and statistics, please visit the Colorado School of Mines Athletics website at <http://athletics.mines.edu>.

CSM Athletics Home Schedules Winter 2008-09

WRESTLING

Oct. 31	Silver & Blue Intrasquad	7:00 pm
Nov. 1	Alumni Dual	10:00 am
Nov. 22	Jack Hancock Dual Invitational	All Day
Jan. 2	Fort Hays State University	7:00 pm
Jan. 23	Chadron State	7:00 pm
Feb. 4	Nebraska - Kearney	7:00 pm
Feb. 7	Rocky Mountain Collegiate Open	All Day
Feb. 14	Grand Canyon University	7:00 pm
Feb. 18	Colorado State University - Pueblo	7:00 pm

SWIMMING & DIVING

Oct. 4	Oredigger Alumni Classic	10:00 am
Nov. 7	CU Club/Metro State/Colo. College	4:00 pm
Nov. 22-23	Rocky Mountain Invitational	All Day
Jan. 17	University of Colorado Club Team	10:00 am

INDOOR TRACK & FIELD

Dec. 5	CSM Alumni Extravaganza	All Day
Jan. 31	Joe Davies Open	All Day
Feb. 20	CSM Twilight Open	All Day

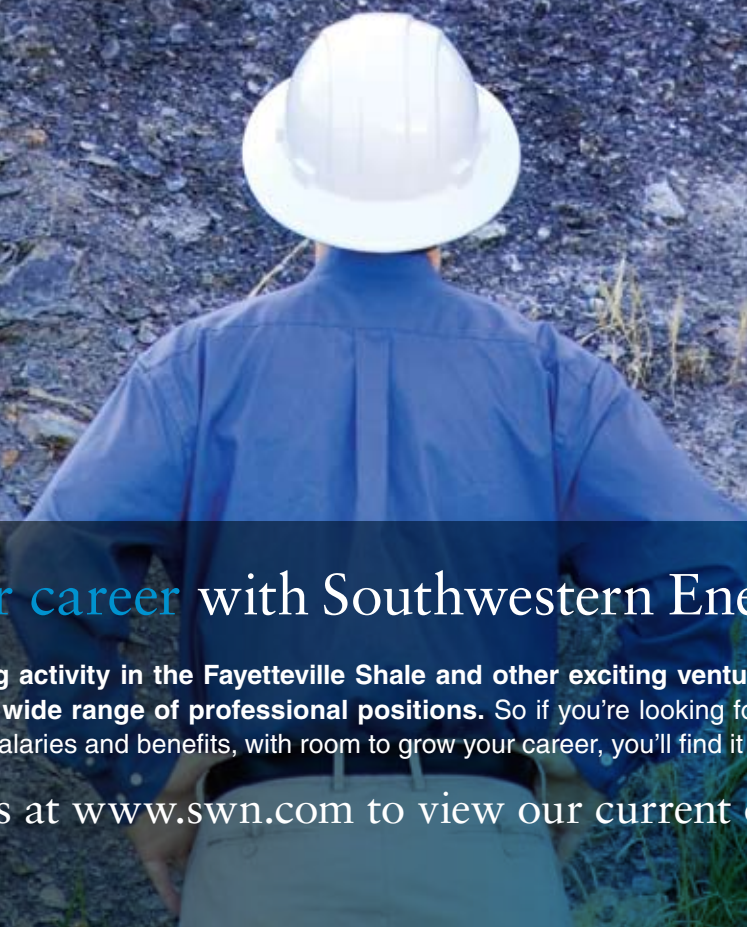
MEN'S BASKETBALL

Nov. 21	Caldwell College	8:00 pm
Nov. 22	William Jewell	8:00 pm
Nov. 28	Northwest Nazarene	7:00 pm
Nov. 29	Newman University	7:00 pm
Dec. 20	Western N.M. University	8:00 pm
Jan. 3	(opponent TBA)	8:00 pm
Jan. 16	Fort Lewis	8:00 pm
Jan. 17	Adams State	8:00 pm
Jan. 30	Regis University	8:00 pm
Jan. 31	Metro State	8:00 pm
Feb. 3	Colorado Christian University	8:00 pm
Feb. 21	UC - Colorado Springs	8:00 pm
Feb. 27	Chadron State	8:00 pm
Feb. 28	Nebraska - Kearney	8:00 pm

WOMEN'S BASKETBALL

Nov. 15	Northern State University	6:00 pm
Nov. 16	Wayne State College	4:00 pm
Dec. 5	Okla. Panhandle State University	8:00 pm
Dec. 6	Johnson & Wales University	6:00 pm
Dec. 20	Western N.M. University	8:00 pm
Jan. 2	University of South Dakota	8:00 pm
Jan. 16	Fort Lewis	6:00 pm
Jan. 17	Adams State	6:00 pm
Jan. 30	Regis University	6:00 pm
Jan. 31	Metro State	6:00 pm
Feb. 3	Colorado Christian University	6:00 pm
Feb. 21	UC - Colorado Springs	6:00 pm
Feb. 27	Chadron State	6:00 pm
Feb. 28	Nebraska - Kearney	6:00 pm

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STUDENTS

Daniel Armijo

Year: **Freshman**Major: **Engineering-Electrical Specialty**

Free college—"it's a once-in-a-lifetime opportunity that I am really lucky to have," said Mines freshman, Daniel Armijo. Daniel, a former Aurora Central High School student, earned a Daniels Fund Scholarship that will finance his education at any accredited two- or four-year college or university in the United States. The comprehensive scholarship covers tuition, room and board, a laptop computer, health benefits, and transportation costs. "It's one of the most prestigious scholarships in the state," said Bruce Goetz, director of admissions at Mines. "They consider much more than just academic performance."

Daniel grew up with his grandparents, Cathlene and Dan Santos, who recognized his potential when he was very young. "He learned to make change at the age of four," said Cathlene, who used to take him with her when she went to sell lunch from her mobile kitchen trailer to workers in the Park Hill warehouse district. "If someone gave him



five dollars, he could give them exactly the right change," she said.

Not surprisingly, he excelled in elementary and middle school. At Aurora Central High he was inducted into the National Honor Society and the National Technical Honor Society. He received the Faculty Award for Exceptional Senior, and as a junior received the Masonic Officers Award for

Outstanding Achievement. By the age of 13, he had earned a black belt in five martial arts—Chinese kempo, judo, aikido, kung fu and karate. Now he's on the Mines wrestling team. "Wrestling is my passion... it keeps me focused," said Daniel. "You get out exactly what you put in."

David Pesek

Year: **Senior**Major: **Engineering-Electrical Specialty**

Last season David Pesek, the Orediggers 2008 starting quarterback, led the Rocky Mountain Athletic Conference for total offense and passing. His success was hard-earned: he invested about 40 hours a week into football while balancing a 17-credit-hour academic schedule. This year he's putting the same amount of time into football, carrying 16 credit hours and working as a peer mentor for a freshman orientation class. David works hard on the field and in the classroom, and his efforts have been rewarded: recruiters don't interview him these days, they try to sell him on the idea of working for them.

But he's not making any commitments just yet. His career objectives shifted recently after spending seven days working in a refugee community in Afghanistan. He was shocked by the stark inequities: "We have so much and they have so little," he said. David's church began supporting the 2,000-strong Pakistani, Tajik and Pashtun community in 2007, after they were summarily relocated from Kabul by the Afghan government to Berek Aub, a dry, bare and inhospitable area one hour north of the capital. "They were left with little more than plastic tarps and the clothes on their back... [the community] was built to fail," David said, pointing out that there was no reliable water supply and it was surrounded by landmines.

Thankfully, the community caught the attention of Sozo



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Daniel is the first person in his family to graduate high school, and he did it as salutatorian of his class with a GPA of 4.12. "My grandparents are the proudest they have ever been," he said. This is certainly true, but there have been lots of proud moments—not just watching Daniel achieve, but also watching him give back. Community service has been an important part of Daniel's life. In fact, it was exposure to the needs within his community that helped him decide on a career in engineering. As he said, it made him want to be "a part of something that makes living more efficient." A talent for math helped too. Thanks to the Daniels Fund, he has the opportunity to fulfill these ambitions: "Without this scholarship, I wouldn't be on a college campus bettering my future," he said. "It's opening doors for me that I might never have knocked on."

International and the UN High Commission for Refugees, and Berek Aub now has a water supply, and the able-bodied members of the community have built a number of permanent houses. Their current goal is to complete a facility that will serve as both a school and a clinic, which David and his church team worked on for the majority of their visit.

Although he is proud of his weeklong contribution to the project, he describes his visit in terms of what he came away with: "They are starting from nothing, but they have such hope that they will have something in the future. I think that each one of us learned something from the hope and optimism painted on the faces of the Berek Aub children."

David was so inspired that he spent the return flight formulating a plan for how he would return to Afghanistan. He wants to find a way to work full-time in the region after he completes his master's degree in mechanical engineering, which he'll begin in August 2009. "Building hospitals and schools and relationships—that's how you are going to defeat terrorism," says David, who once had plans to join the military. "The Taliban recruits people with no hope for the future. If you give people a future, then they aren't going to join the Taliban."

Mines'
biggest
fan in

the stands

Marv Kay

By Jennie Lay

Silver and blue are the only fan threads Marv Kay ever imagined flaunting. The legendary Oredigger football coach and athletics director was practically born on campus. His father was a junior at the time, and they lived across the street from the President's House. Growing up playing sports among the mining towns on Colorado's Western Slope, the man who would devote most of his life to Colorado School of Mines, never saw himself headed anywhere else. "I think I was destined. It was something I had always dreamed of," he says.

Respect and admiration for Kay was palpable on October 3 when he was honored as the sole inductee into the 13th annual class of the Colorado School of Mines Athletics Hall of Fame. Held in the Lockridge Arena, the event was attended by over 330 members of the Mines community and included remarks by President Scoggins and several of those who have worked closest to Kay over the years.

As a student at Mines, Kay lettered in wrestling and football, earning himself All American recognition and a free agent contract with the Denver Broncos. After he graduated in 1963 with a bachelor's degree in mining engineering, he spent two years as a first lieutenant in the U.S. Army Corps of Engineers. Fritz Brennecke, his former football coach and the Mines athletics director at the time, then offered him the opportunity to work as assistant football and head swimming coach, "to pass the time while I figured out what to do with the rest of my life," Kay says. "One year turned into a life. Probably Coach Brennecke saw something in me I didn't see in myself."



“Marv does not have blue blood. He has blue and silver blood.”

—Bruce Allison, former Mines athletic director

Three years later Kay became head football coach, a position he held for 24 years. This was followed by a nine-year tenure as Mines athletic director, overseeing not only varsity NCAA intercollegiate athletics, but recreational sports, the school’s mandatory physical education courses and athletic facility development. Kay concurrently served the community of Golden, serving as mayor for eight years and sitting on Golden’s city council for 12. The awards he’s received for his civic, philanthropic and athletic accomplishments are too numerous to list, but when pressed, he’ll admit that the three he is proudest of are his Mines medal awarded in 2003, being named Distinguished Faculty Lecturer by Mines’ Faculty Senate in 2005 and having Marvin the Miner named in his honor.

“Marv does not have blue blood. He has blue and silver blood,” says former Mines athletic director Bruce Allison. He describes Marv as a caring coach who “knew his players intimately and looked out for their best interests then and probably still does for a few of them.”

Though Coach Kay always enjoyed winning, it was the success of his athletes that gave him the greatest satisfaction over the years—on the field and in the classroom. As he explains it, his dream has always been to see the school’s academic excellence reflected by comparable achievements in athletics—and this vision is becoming a reality. “We’ve evolved into a program that’s reaching the top levels of Division 2 athletics,” Kay says with pride. “We’re saying it’s okay to stress athletic excellence. It’s proven that the two go together.”

But it’s taken many years to make that case; Kay recalls a time when financial support for athletics was a much lower priority. Helping to change that is part of his legacy.

“We wanted to present to the world upon graduation a well-rounded student,” Kay says. “Historically we weren’t always able to do that. It’s been a process, to bring all this to the forefront.” One of the keys to this evolution was moving the entire responsibility for athletics from the President’s Office and the Office of Academic Affairs to Student Life, where it doesn’t compete with academic departments for funding. Kay stresses that it couldn’t have happened without the vision and support of John Trefny, president emeritus, and Harold Chevront, the school’s vice president for student life.

“Over the years, I developed a deep respect for Marv’s understanding of both sides of the equation,” Trefny says. “I do believe it was revolutionary as well as spectacularly successful,” he adds, crediting

Kay and Chevront for much of the plan’s accomplishment. “It has obviously led to notable success by our varsity teams, including the first undefeated football team in 65 years. Just as satisfying has been the success of our club teams and the phenomenal student participation in intramural sports and recreational activities.” In addition, the new administrative structure set the stage for Student Life to spearhead several major initiatives, including construction of the new Student Recreation Center, the addition of the new intramural and recreational fields, and the current improvements to the creek side playing fields.

“We are only now seeing the full impact. These new facilities have transformed the quality of student life. Participation in intramural and club sports is at an all time high, and they are having an impact on the recruitment and retention of students,” says Chevront, who points to Marv’s “student-first attitude” as a source of inspiration throughout the whole process.

Reflecting back on his own career at Mines—as a student, an athlete, a coach, a teacher and an administrator—Kay is immensely grateful: “It was the fulfillment of a lifetime of dreams. I couldn’t ask for anything more.”

Since retiring as a member of the faculty in 2003, Kay has turned to part-time fundraising for Mines. “After being in the program almost 30 years as a player and a faculty member, I felt I had some strong desires and some dreams about the direction the programs could and should go,” he says. As leader of the fundraising program, he’s had the opportunity to make some of those dreams a reality.

He’s brought millions of dollars to the school for new facilities, including support for the recently-completed Student Recreation Center and the soon-to-be-completed outdoor facilities. But he hesitates to quantify this, deferring to the teamwork of faculty, administration, alumni and students involved in making it all happen.

When he’s not fundraising, he’s often cheering on the Orediggers. “I seldom miss a contest in any of the sports. I love to see the young men and women at Mines compete. It’s very rewarding,” says Kay, who admits he misses the daily interaction and hustle-bustle of his students.

As for his induction into the Athletic Hall of Fame, Kay says he can’t think of anything nicer that has ever happened to him. “I’m overwhelmed with the honor. And I’m looking forward to the football game on Saturday.” **M**



Tom Spicer, director of athletics (left), and Bill Engel '60 (right) pose with Marv. Bill, a lifelong friend, teammate and classmate, presented the award to Marv.



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Dean Carlson

A Grand Adventure

Excerpts from Steve Sonnenberg's travel log

Edited by Nick Sutcliffe

A trip down the Grand Canyon offers exhilarating adventure, solitude, awe-inspiring natural beauty and a distant retreat from modern life. When you take this trip with Mines geology professor Steve Sonnenberg PhD '81, it is all these, plus a guided journey back in time through a long chapter of the Earth's history; the Grand Canyon is one of the most complete sequences of rock to be found anywhere, spanning a period from about 200 million years ago, to close to 2 billion. This year marked the eighth time Steve has led this trip for the Colorado School of Mines Alumni Association, and the 13th time he has gone down the Grand Canyon. Not surprisingly, the guided trip is extremely popular and always has a long waiting list; a group of 28 were lucky enough to go this year. The following is an abbreviated and edited account of this year's adventure based on Steve's travel log. To read the unabbreviated version and see many more photos, go to www.mines.edu/magazine.

John Wesley Powell made the first boating journey down the Colorado River and through the Grand Canyon in 1869. After exploring about a 1,000 miles of river upstream from the canyon, he wrote, “We are now ready to start on our way down the Great Unknown. We have but a month’s rations remaining. We have an unknown distance yet to run, an unknown river to explore. With some eagerness and some anxiety and some misgivings, we enter the canyon below and are carried by the swift water.”

Today we know much more about where we are going, but this trip is still a long and exciting adventure through isolated country, and some very large and potentially dangerous rapids. Thankfully, we are in good hands.

Hatch River Expeditions, our outfitter, has been guiding trips for over 70 years, and our three boatman/boatwomen, Ray Pope, his wife Joni, and Sarah Clinger, have over 50 years of combined river experience. Our rafts are 33 feet long and 10 feet wide, each equipped with a 35-horsepower engine. While Powell had to carry his wooden skiffs and gear around most of the whitewater to avoid wrecking on the rocks, we run every rapid in the canyon.



Day 1

I was relieved last night when we gathered to find all accounted for. We are a diverse group, with alumni from the '50s, the '90s and every decade in between. This morning, we are picked up early at our motels by Hatch. Since we are now on Grand Canyon time, most have put their watches away and left their Blackberries behind—we'll have no cell phone coverage and no communication with the "Rim World" for 7 days. At Lee's Ferry we meet Ray, Joni and Sarah. The boats are loaded with food and supplies, so all that is left is to stow our personal gear and cover it with tarps. Drinks for the day are kept cool in drag sacks draped over the stern. After a general orientation and safety discussion, we cast off.

During the first few days we will be heading south, but after the confluence of the Little Colorado, the river swings west. We begin our journey in the Triassic Moenkopi Formation (famous for reptile footprints), formed about 240 million years ago when this area was an arid to semi-arid coastal plain.

After we run our first rapid, Badger Creek, we stop to look at some 245 million-year-old footprints in the Coconino Sandstone, probably reptile and millipede tracks. Our first Grand Canyon lunch is a big spread of meats, salad, pickles and cookies—it is clear we will not be losing any weight on this trip. After lunch we run several small rapids before arriving at our campsite at river mile 20.5. Here most of us enjoy a scrambling hike up North Canyon, returning to a dinner of steaks, potato salad and cauliflower, followed by a Dutch oven cake—Powell would be jealous.

Day 2

The day starts at sunrise, around 4:45 a.m. (It is a good idea not to have a watch on.) Coffee is on and we are treated to eggs-to-order, bacon, muffins, fruits and juices, after which we pack the boats by forming a long "duffel line," along which all the equipment and gear is passed. We are on the river by about 8:00 a.m. This morning we go through the Roaring Twenties—a series of rapids between river mile 20 and 30—before stopping to look at fossils in the Mississippian Redwall limestone (brachiopods, corals and crinoids).

Later, we hike to see some Anasazi petroglyphs and



Dean Carlsson



Steve Sommerberg



Steve Sommerberg

small granaries used for storing corn. Populating the area from about 900 to 1100 A.D., the Anasazi cultivated corn, beans and squash. The corn was their staple, and they went to great lengths to store it safely, building dry, varmint-proof structures in hard-to-find locations. Later in the day we spot an ancient footbridge high up on the canyon walls—one of the Anasazi's several routes in and out of the canyon area.

Further downstream, there's a huge spring in the Redwall limestone that Powell named Vasey's Paradise. It's an oasis lush with ferns surrounded by bone dry, sunbaked rock—a striking contrast.

We lunch at Redwall Cavern, which Powell estimated could seat 50,000 people. The children on the trip, Jackie and Zach Foss, and Kai Benedict, have become great friends, and after lunch they enjoy a swim and then play in the sand and mud together. Climbing up a side-canyon a little further downstream, we see yard-long nautiloid

fossils—relatives of present-day squid and octopus that swam the deep ocean here over 300 million years ago.

That evening after dinner, Dean Carlson '93 reads from his great uncle's diary, Willis Johnson, who traveled through the Grand Canyon in 1938 with Buzz Holstrom, a famous river runner—it sounds as though little has changed.



Dean Carlson

Day 3

Downstream from our campsite we encounter the Cambrian Tapeats Sandstone that was deposited in a coastal beach and shallow sea environment. Evidence of marine life abounds with numerous burrows in the Tapeats. Looking up at the canyon walls, the colors are breathtaking: intense shades of brown and red superimposed on a blue sky. We enjoy lunch, shaded by slabs of sandstone jutting out from the cliff. The shade feels good, although the weather has actually been relatively cool for this time of year, with highs in the mid-90s.

Later that day we reach the confluence of the Little Colorado River, which is flowing red from recent rains. Unperturbed by the muddy water, many of us enjoy a swim, floating through some small rapids with life jackets as pads.

The evening is spent dining on salmon, enjoying another cake from the Dutch oven to celebrate the birthday of Fritz Foss '85, smoking some prize Cuban cigars he brought for the occasion and sharing our collective knowledge of the night sky with the help of a pocket laser.

Day 4

From this campground, the river meanders in a wide loop, allowing us to hike across land to Lava Canyon where the boats meet us later in the day. On the two-hour walk, we come across some Precambrian stromatolites—finely layered limestones deposited by some of the earliest life forms on Earth. Over the course of about 2 billion years, starting about 2.7 billion years ago, stromatolites are thought to have gradually ratcheted down concentrations of carbon dioxide in the atmosphere through photosynthesis, simultaneously raising concentrations of the oxygen-rich gas most organisms depend on today.

While mulling over these events from our planet's distant past, we run across some much more recent artifacts of life on Earth: a site where about 40 Anasazi families once lived. Remains of dwellings are easily distinguished and pottery shards are abundant.

Back on the river we see a fair amount of whitewater. Unkar (rated 6) is the first really big rapid we've run. As the river accelerates, a sheer cliff forces it to the right and massive standing waves curl and crash on their upstream face.

The only brush river runners have with the outside world during the 188-mile journey down the Grand Canyon is Phantom Ranch. Later this afternoon we pass this outpost without stopping—no one needed to contact the "Rim World." That night we camp at Upper Trinity Creek (river mile 91), where we feast on fajitas and guacamole.

Day 5

We run several rapids during the course of the morning, the most memorable being Hermit. The rapid is a roller-coaster ride through huge standing waves, at the top of which one feels practically weightless. It wasn't clear whether he was lifted by his own momentum or swept off by a wave, but Chris Benedict '83 parted company with his raft briefly in Hermit. Acting with impressive speed, the boatman cut the engine and raced to the bow where Chris was clutching a rope. Dripping though he was after being hauled back in, he didn't look much wetter than the rest of us—Hermit had given us all a thorough soaking.

Later that day we hike up to Elves Chasm, a beautiful waterfall with a deep pool at its base where several of us enjoy some cliff jumping and a refreshing swim. In

Blacktail side-canyon we examine the 1.7 billion-year-old Precambrian Vishnu metamorphics, overlaid by the relatively young Tapeats Sandstone (550 million years old). Known as the Great Unconformity, the 1.2 billion-year time gap we were looking at corresponds to a quarter of the Earth's history. To varying degrees, this phenomenon is found almost everywhere around the globe and it's a source of endless debate among geologists: what combination of conditions could have worn away at the Earth so universally over such a long period of time? And what brought these conditions to an end? It's an alluring question, and we enjoyed some speculation of our own on our walk back to the boats.

Day 7

The end of the trip is getting closer, but there's some anticipation in the air: today we run Lava Falls, the biggest of all the rapids in the canyon. Formed by several eruptions that took place over the last 1.5 million years (yesterday in geologic time), the area caught Powell's imagination: *"What a conflict of water and fire there must have been here! Just imagine a river of molten rock running down into a river of melted snow. What a seething and boiling of the waters; what clouds of steam rolled into the heavens."*

We approach Lava Falls with some trepidation—it is rated at about 9 with current flows. I am in the lead boat with the head boatman, Ray. In all, the river drops about 13 feet through the falls and there is a sharp turn toward the bottom. We don't stop to scout, but the other boat does. As the tranquil waters accelerate and constrict, the river is transformed into some huge standing waves and one notorious hydraulic that flips 20 foot rafts as if they were toy boats. Ray enters the rapid close to the right bank and we hit some big waves that soak everyone. He then accelerates with full power toward the left bank to avoid a huge boulder at the bottom of the rapid. In the midst of the swirling current, with 14 people and well over 1,000 pounds of cargo to shunt, a 35 h.p. motor has limitations; we push across the current agonizingly slowly. I watch the rock approach, assessing our progress instant by instant, and share a collective sigh of relief with others when we clear it by less than two feet—literally. From the eddy on river left, we watch Sarah bring her boat safely down, giving the rock a rather wider berth. A shout of excitement goes up from both rafts as they join us in the eddy.

For a few minutes we remain there, watching the powerful water coursing down the drop. Then, as Ray swings our bows downstream once more and we begin the last eight miles of our journey, there's a shift in the mood—I don't think any of us want this trip to end. Our final campsite is right next to the helicopter pad at river mile 188. We enjoy another sumptuous supper together and share highlights of the trip. The helicopter will arrive

by 7:00 a.m. and several of us resist going to our tents as it signals the end of a fun and magical journey. As stars begin to light up the sky we ponder the vastness of the universe and its age. We have traveled through about 2 billion years of earth's history on this trip. The earth is approximately 4.5 billion years old. The universe is about 13.7 billion years old and about 93 billion light years across. Light from far distant stars can take billions of years to reach earth. We ponder many things. It is time to return to "Rim World." [M](#)

Go to www.mines.edu/magazine for the unabbreviated text and many more pictures. And to sign up for next year's trip, go to www.minesonline.net and click on "events."



Dean Carlson



Steve Sonnenberg

The Mines Curriculum

By Larry Borrowsky

Are Today's Students
Cruising Down Easy
Street?



Ralph Baird knew the School of Mines was going to be a challenge from the moment he arrived for his admissions interview in the spring of 1967.

"I took the bus out from the airport," says Baird '71, "and I got off downtown and called up to the admissions office to tell them I'd arrived. At every other school where I interviewed, people chauffeured me around. But at Mines they just said: 'We're at the top of the hill. Look for the gold dome. We'll be waiting for you.'"

Baird had to hoof it up to Guggenheim with his heavy bags in tow. And he decided right then that Mines was the college for him. "That impressed me," he says. "I knew I'd have to work for whatever I got. I knew I'd have to earn it. And I found that attractive."

But Baird wonders whether today's undergraduates have to climb the same hills that he did. He believes the curriculum has been diluted and the workload trimmed down, costing Mines the pre-eminent position it once held. Baird cites courses that were once covered over two semesters but are now squeezed into one. He decries the reduction in required credit hours. And he regrets the phasing out of the professional degree, which was the only credential available to those entering as freshmen up until 1965. It required more than 160 credit hours (a bachelor's degree today requires around 140), and was, in essence, a bachelor's degree plus a professional master's degree.

"The challenge that Mines offered 40 years ago doesn't exist today," says Baird, founder and owner of Houston-based Baird Petrophysical International. "When I was going to school, you were lucky to survive. It was impossible to complete all the coursework because there was so much to do."

"People were taking 18 to 21 hours a semester," adds Richard Jolk '78, a mining consultant who holds a doctorate from Mines, in addition to a bachelor's and two masters' degrees. "It was a very demanding workload. The average GPA was only a 2.7 or 2.6. At CU, the average GPA was a 3.1, but those students got out with only 120 credit hours or so, while we were getting out with about 150. They had a much more comfortable time of it than we did."

Does Mines pose the same cut-above challenge it used to? Baird and Jolk are not the only ones asking the question. Having seen the credit hours required for graduation drop over the years, some alumni wonder whether their degrees are being devalued. In addition, faculty and administrators are concerned about maintaining standards, participating in the kind of self-examination that has proliferated across scientific disciplines in recent years. The rapid increase of technological expertise in India, China and other rising economies has stiffened competition, and the question of whether U.S. institutions are adequately preparing today's students for tomorrow's challenges is critical.

Cathy Skokan '70, MS '72, PhD '75, an associate professor of engineering who has taught on campus for 32 years, has witnessed the evolution of Mines' curriculum first-hand and points out that when you stack the school up against other institutions, it remains a very stiff challenge. "While the typical engineering undergraduate averages 12 to 15 hours a semester, our students take 15 to 18 hours a semester," notes Skokan, who in 1974 became the first woman to earn a doctorate from Mines. "Some of them juggle 20 to 21 hours of academic credit in a semester. Our students know how to work."

"That's certainly been true in my case," says Adam Smiley, a senior engineering student. "Every semester I've been here, I've carried 17 to 18.5 credit hours. That translates to between 21 and 23 hours of actual class time—and for every hour of class, I usually spend 2 hours outside of class on homework, lab reports, that sort of thing." In addition, Smiley works part-time (he's held as many as three jobs at once). He also heads up the campus chapter of the Society of American Military Engineers.

In raw numerical terms, today's Mines students don't have to log as

“Not only are the students top-notch technically, but they are also well-prepared in important business aspects such as communication, relationship-building and teamwork.”

many credit hours as the undergraduates of 30 years ago. A Mining degree earned in 1978 required 148 credit hours; the same degree today requires 136. But some argue that this does not necessarily translate into a less rigorous intellectual challenge.

“We need to think about what can be accomplished in one credit hour in terms that relate to how we teach,” says Provost Nigel Middleton. “The calculus and differential equations sequence that took us 20 credit hours to cover in the 1950s is covered in 15 today. Academically and intellectually, we cover the same content and teach the same concepts. It’s just that we can pack more material into today’s credit hour than we could in the 1960s.”

How is that possible? In part, it’s a function of technology. Forty years ago, students spent a fair amount of their course time calculating complex problems on paper and using slide-rules. Today’s students can make those same calculations in seconds via a calculator or computer.

“That’s a real powerful difference,” says Skokan. “Our students still do some hand calculations, but only enough to master the basic concepts. They can move beyond that very rapidly and get to a deeper level of analysis and problem-solving. You learn the same material, but much more efficiently.”

“Computers enable us to cover quite a lot more ground, and show a lot more complicated circumstances and realistic situations, than we could in a pencil-paper environment,” adds Middleton. “Consider a course such as thermodynamics. You can do some extraordinary computational simulations and visualizations that relate, for example, to fuel combustion in a modern jet turbine. The simulated engine in the experiment is driven by the underlying science and thermodynamic laws that the students are drilled in anyway. But the opportunity to manipulate and explore the phenomena that derive from that science is exhilarating in a learning environment; I think it’s been a multiplier.”

A multiplier that cuts both ways: While it increases the educational yield, there’s sweat equity students have to invest on the front end. Although students who come to Mines today are very tech-savvy on admission, once here, they have to master specialized computer-aided design (CAD) and computer-aided engineering (CAE) programs, adding elements to the undergraduate workload that didn’t exist 20 or 30 years ago.

“If you’re talking about seat time, students do spend less time in the classroom than they used to,” says Barbara Olds, associate provost for educational innovation. “But if you’re talking about intellectual rigor, nothing has been lost. In some respects, it’s tougher—science is more complex than ever, and as a result our students have to master some skills and concepts that weren’t taught a generation or two ago.”

As in the past, Mines students today devote considerably more out-of-class study time than their contemporaries at other institutions.

The most recent National Survey of Student Engagement, which polls students from hundreds of institutions around the country, found that a degree from Mines involves considerably more study time than its peer institutions.

One course that bumps up out-of-class study time is EPICS: a two-year design sequence that gives first- and second-year students practical, hands-on design experience. Working in teams, students make oral and written presentations, handle budgets, evaluate materials, meet project deadlines, and practice other skills they’ll eventually need in the workplace. These assignments require dozens of hours of work outside the classroom.

“EPICS was one of the first programs of its type nationally,” Olds observes. “When we launched it in 1983, there were only two or three other schools in the country that had anything similar. Today you’ll find something like it at nearly every engineering school.”

To some, these innovations are nothing to celebrate. In fact, they are seen as part of the problem. “The curriculum has become very ‘flavor of the day,’” says Jolk. “Mines has this biotechnology program now [Bioengineering in Life Sciences]. We have mineral economics. We have humanitarian engineering. Mines once had a specialized niche, and it excelled within that.”

“Mines is a natural resources school,” adds Baird. “But it has broadened its curriculum so much that it’s no longer a natural resources school. Anything outside of a natural resources major is a token department. They should be supportive of the main goal of the school.”

“The latest strategic plan focuses on earth, energy, materials and the environment—that’s very much within the school’s traditional areas,” counters Olds. “I would argue the school hasn’t diluted its mission, but rather is adapting that traditional mission to the 21st century.”

In part, curriculum changes have been mandated by accrediting agencies, such as ABET. Nontechnical requirements have been added in recent decades that must be addressed in undergraduate curricula. Perhaps more important, adaptation has also come in response to market pressure: employers have made it clear that they want engineering schools to produce well-rounded graduates.

“When you talk to a recruiter,” says Middleton, “they want students who can think on their feet, who are skilled in communications, who can behave professionally in the boardroom, who understand cultures around the world and are comfortable going to Singapore or Australia. We hear that from recruiters, so we have to address that. It’s got to be a part of the experience we provide at Mines, in addition to the mainstream science and engineering of their majors.”

Bruce Clemens ’78, a professor of materials science and engineering at Stanford, points out that while some things change over time, there are curriculum fundamentals that remain constant. “You want to give students lots of practice at solving hard problems,” he

says. "And you want to give them the intellectual agility to tackle anything, and the confidence that they can do it." Clemens' own experience suggests the school continues to meet this obligation—he describes the Mines graduate working in his Palo Alto lab as "the best student in my group."

And if demand for Mines grads is a good reflection of how well students are being prepared for the workplace, then the school is still at the top of its game: job placement rates for 2007 grads are 99 percent for bachelors' degrees, 100 percent for masters' and 98 percent for doctorates. The 2008 fall Career Day was attended by more than 200 employers, and had a waitlist half as large. After the spring 2008 Career Fair, a Northrop Grumman recruiter wrote, "CSM has the best technical students in the region. Our managers are always impressed with the caliber of interns and college hires that we have on staff." Meghan O'Connell of Olsson Associates echoed these sentiments: "Not only are the students top-notch technically, but they are also well-prepared in important business aspects such as communication, relationship-building and teamwork."

Adam Smiley—the electrical engineering major previously men-

tioned—works periodically for the Foundation's call center, helping to fundraise for the school. Naturally he ends up talking with a lot of alumni, and once in awhile he hears comments about how easy today's students supposedly have it. But he doesn't take these comments to heart. "I just think they don't know what's expected of students right now," he says. "I don't know what their experience was like; I wasn't there. But by the same token, they can't really understand what a student goes through today, because they're not here."

Speaking with both Smiley and Baird, it's clear that they both take pride in their education, and that they have both worked hard to earn it. As he climbed the hill to Guggenheim in the mid-sixties, Baird sensed that Mines would be a challenge—and he was right. Similarly, students today arrive on campus with the expectation that Mines is a difficult school, and their experience bears this out. So while much has changed, it might just be that the hallmarks of a Mines education are as indelibly imprinted on the school's 21st century graduates as they ever have been, and those who descend the hill today with degree in hand have a great deal in common with those who have gone before. [M](#)



From left: Tyler Curtis, freshman; Stephanie Biagiotto, freshman; Aaron Swift, junior

The Network

Students Invited to Join CSMAA

CSMAA recently launched the M-ulators, an entirely new level of membership to the alumni association. The intention is to create a sense of community among its members, and provide some valuable global networking opportunities to students by linking them with alumni. “There are lots of ways that students can benefit from contact with alumni, and we are confident that many alumni will value the opportunity to interact with today’s students,” said Liz Garcia, associate director of campus programs and membership services.

One way M-ulator members can connect with alumni is through the Mentoring Program, which pairs current students with alumni

M-ulators

of similar interests, goals and/or majors. Now restricted to M-ulators,

this program was previously open to all students through an application process. In addition, members will receive special invitations to events such as the Professional Development Series and Denver Metro Alumni Receptions, giving them pre-event access to keynote speakers.

Like all members of CSMAA, student members will receive a number of other benefits including discounted car insurance with Liberty Mutual, CSM Bookstore discounts (excluding textbooks), eligibility to join the Credit Union of Colorado and access to special scholarships.

M-ulators was launched at the Celebration of Mines, where 45 students joined with their \$20 annual membership fee—membership has since grown to 64. Students can join by going to www.minesonline.net or by calling 303.273.3295.



www.MinesOnline.Net

An online community.

Connect in a whole new way!

Stay tuned.



What a Sendoff!

In late July and early August, in eight cities around the U.S., alumni and friends came together with current students to give incoming 2008 freshmen from their area a friendly sendoff. These events have become a well-attended annual tradition—this year more than 200 participated. Hosts organized events in a variety of venues. Outdoor picnics were arranged by Kenji Farinelli '74 in Colorado Springs, Josh '04 and Michelle Lamb '98 in Tulsa, and John Howe '83 in Grand Junction. Robin Simmons '83 in San Antonio, Warren Hildebrandt '59 and Randy Ollmann '98 in Los Angeles, and Glenn Vawter '60 in Glenwood Springs hosted their guests at local restaurants. Sara Atkins '00 and Duane Maue '90 entertained at an Astros game in Houston. Similarly, Tim Saenger '95 and Wilson Culp '99 celebrated at a Dallas Rangers game. "I was grateful for the opportunity to meet a group of people who knew about Mines," said Cory Bacon, one of this year's freshmen attending the event in Los Angeles. "My parents too. They were a little apprehensive about me leaving for college. Knowing more about Mines helped," he added.

Warren Hildebrandt and Randy Ollmann hosted this sendoff party at a restaurant at Los Alamitos Marina, Seal Beach, CA. Clockwise from left: Cathy Bacon with her freshman son, Cory, and husband, Ron; Lisa Mauger '07; Hannah and Ryan '05, MS '06 Briggs; Randy '98 and Sunshine Ollman with their son; Matt Pusard (current student); Pete Mehta '55 with his wife, Pat

The Alumni Association would like to say a big "thank you" to all this year's hosts and to the many who made time to attend. CSMAA will organize sendoff parties again next year. Please contact Serena Stickney if you are interested in hosting an event in your area (serena.stickney@is.mines.edu).

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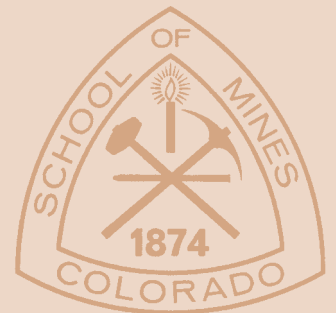
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Fast Forward

Class Notes
Weddings
Alumni Profiles
Births
Passings

1939

John Poitevent Golden II is retired and now lives in Marietta, GA.

1954

Robert Kendrick has been named chairman of Oro Gold in Vancouver, BC. Oro Gold is an exploration company with active properties in Mexico and Panama.

1964

Dale D. Teeters received a masters in mine safety from Marshall University in May 2008.

1965

Michael R. DeSilva is group legal counsel – projects, and commercial director – capital projects for Newmont Mining Corporation. He lives in Highlands Ranch, CO.

Thomas E. McKelvey is chief executive officer for QED Engineering Design, Inc. in Ramona, CA.

1966

Thomas G. White writes: “In August 2007 my company, Peru Copper, was sold to Chinalco. Chinalco is a very large Chinese aluminum company and the largest shareholder of Rio Tinto. Working for the Chinese has proven to be a wonderful experience. I am in an interesting situation with Chinese staff and engineering companies now reporting to me. The new world of resource development! Who ever would have guessed.”

1969

Robert I. Watkins is a project manager for Fluor Enterprises in Greenville, SC.

1970

Larry A. Cramer has retired from Anglo Platinum and now is consulting for Braemore Resources. He lives in Zinkwazi, South Africa.

Richard K. Swinney is retired and lives in Grass Valley, CA.

Lee A. Turner is senior vice president – QHSE for Smith International, Inc. in Houston, TX.

1971

Roger Newell is the president and CEO of Lake Victoria Mining Company, a gold exploration stage company focused on acquiring and exploring potential gold mineral deposits or reserves in Tanzania.

1973

Robert W. Hudson was ordained as a priest in the Anglican Church on July 12, 2008. He is the pastor of St. Luke’s Anglican Church in Maysville, KY.

Donald E. McLaughlin is retired from Exxon-Mobil and lives in Loveland, CO.

1976

Gregory L. Brown is a geophysicist for Stone Energy Corporation in Houston, TX.

Randal L. Bruno is a project manager for Sierra Mountain Construction, Inc. in Tuolumne City, CA.

Gregory T. Kelleher is vice president and general manager of the southern division for Devon Energy Corporation in Houston, TX.

Michele K. Mudrone is a petroleum engineer for Haas Petroleum Engineering Services, Inc. in Dallas, TX.

J. Patrick Nolen is the assessments program manager for Argonne National Laboratory near Chicago, IL.

1977

Gunnar E. Holmes is a senior operation geophysicist for Shell Brasil E & P in Barra da Tijuca, Rio de Janeiro, Brazil.

1978

Dennis R. Cahill is president and a consulting geophysicist for D&F Resources, Ltd. in Midland, TX.

1979

Ramona Nicks Heikel is an engineering assistant for Enersul Technologies in Calgary, Alberta.

David M. Jurich is a senior associate for Hatch Mott MacDonald in Phoenix, AZ.

Michael A. Walker is lead engineer of materials and test for Instar Engineering and Consulting, Inc. in Littleton, CO.

1981

Leanne M. Baker is managing director for Investor Resources LLC in Sebastopol, CA.

Kenneth A. Giese, Jr. is a building sales specialist for Cleary Building Corporation in Caldwell, ID.

Weddings



Jon Edeen '05, MS '06, (Grad. Stdnt) and **Amanda Catalano '08** were married on July 25 at the Pines at Genesee in Golden, CO. Mines alumni attending the wedding included **Jenn Crites '07, Tim Notz '06, Tyler Streich '06, Mark Helms '06, MS '08, Adam Schmetzko '06, Cary Allen** (Grad. Stdnt), **Kelsey O'Connor '07, John Haynes III '06, James Reeves '08,** and **Nick Geanetta '06.**



Steve Grigel '01 and **Kaycie Rosen** were married on June 9, 2007, in Boulder, CO. Mines Alumni in attendance were: **Katie '01** and **Alex '01 Yancey, Mike Koy '96, Bob Schulz '98, Jeff Berget '02, Matt Kuplik '01, Darren Mabe '01, Justin Anderson '02, Mindy '01** and **Brian '98 Arbuckle, Kevin Wurth, Eric Huelson '01, Lt. Pete Gray '01, Casey Bernal '02, John Woolley '01,** and **Jack Pecoro '02.**



Stephanie Onorofskie '01 married **Nathan Helfenbein** on June 28, 2008 on their property in Redstone, CO.



Erik Ressel '96 and **Kim Kreutzer** were married on November 3, 2007, in the Presidio Chapel in San Francisco. In attendance were Mines alumni **Jason Markle '96** and **Alex Siler '96.** The couple honeymooned in South Africa.



Ilya Kats '96 and **Caty Sung** celebrated their marriage in freefall over Skydive Temple near Austin, TX on May 12, 2007.

Alan C. Harrison is vice president of the Denver Region/Piceance Basin for Williams Production RMT Company in Denver, CO.

Thomas K. Lampert is president and owner of IronSyte Monitors in Pittsburgh, PA.

Douglas B. Ramsey is a business planner for ExxonMobil Corporation in Baton Rouge, LA.

Sandra M. Stash is vice president of HSEA for Talisman Energy in Calgary, Alberta.

1982

Eddie E. Gerze is senior program manager for tw telecom in Littleton, CO.

1984

Jeffrey P. Lee is being assigned to Garmisch-Partenkirchen, Germany, to join the Defense

Threat Reduction Agency. He will support the George C. Marshall European Center for Security Studies and serve in the College of International and Security Studies. He writes, "As a member of the Marshall Center faculty, and representing DTRA's interests, I will have the opportunity to inform hundreds of future leaders from Europe, Eurasia and around the globe on weapons of mass destruction/chemical, biological, radiological, and nuclear threats, and on U.S. programs to counter those threats."

Thomas K. Moffitt is US sales manager of water-well and deep hole drills for Atlas Copco CMT USA in Pleasant Grove, CA.

Thomas D. Tharp is a senior engineer for the Chicago Board of Options Exchange in Chicago, IL.

1985

Susan P. Foss is manager of E&P Systems for Anadarko Petroleum Corporation in Denver, CO.

Jay D. Menardi is coordinator of Youth Ministry for St. Anthony's Catholic Church in Casper, CO.

Gregory D. Pierson is principal process engineer for Fluor Corporation in Sugar Land, TX.

1986

Andrew B. Flynn is principal of Landmark Environmental in Denver, CO. Landmark Environmental is a licensed and insured environmental firm offering depth of expertise and a variety of capabilities to governmental and industrial clients on a regional and national level.

1987

David H. Thornton is operations manager for Equatorial Guinea LNG.

Profile

Alumni-Faculty Tenured, Promoted

Seven alumni currently serving as faculty at Mines received promotions and/or tenure at the end of the 2007-2008 academic year. The alumni association is proud to recognize the achievements of these special members of our alumni and campus communities.



Joe Beach MS '99, PhD '02 promoted to associate research professor of physics. Both Mines degrees in applied physics. Researches photovoltaics and sustainable energy. He says: "I came to Colorado School of Mines for graduate school specifically to become involved in sustainable energy. I am happy that it has given me the opportunity to continue working in that field as a post-doc, entrepreneur and research professor. CSM has a great opportunity to help the U.S. adopt sustainable energy."

Mike Colagrosso '99 received tenure and promoted to associate professor of mathematical and computer science. BS in mathematical and computer sciences from Mines, MS (2001) and PhD (2002) from the University of Colorado at Boulder. Teaches Operating Systems,

Machine Learning and Advanced Pattern Classification. Researches wireless, low-power computers. ("I put them in environments, like underground mines, to sense their surroundings and alert people to interesting events.") What he says: "In *Top Gun*, the best of the best have the option to come back to be instructors. On good days, I feel like that at Mines. On bad days, I'm astonished that students haven't seen *Top Gun*."

Hugh Miller '86, MS '91, PhD '96 received tenure as associate professor of mining engineering. Bachelor's degree in geophysical engineering, master's and doctorate in mining engineering. Teaches Mine Investment Analysis, Senior Mine Design, Introduction to Mining, and Mine Safety. Researches occupational health and safety, artesiana mining in the developing world, mining systems and equipment technology, hydraulic excavation and waterjet technology. What he says: "Mines is a special place and I feel privileged to be part of the faculty."

Jennifer L. Miskimins MS '00, PhD '02 received tenure and promoted to associate professor of petroleum engineering. Both Mines degrees in petroleum engineering. Teaches Well Stimulation, Advanced



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Left to right: Jennifer Miskimins, Hugh Miller, Mike Colagrosso, Paul Santi, Jim Ranville

Well Stimulation, Petroleum Economics & Evaluation. Researches well stimulation, completions and unconventional reservoirs. What she says: "I think being a PE alum helps form a strong connection with other alumni from the department. You understand what they went through to obtain their degrees and you share that sense of accomplishment. From a teaching aspect, this knowledge helps tremendously to relate to and interact with current students."

Vilem Petr PhD '01 promoted to associate research professor of mining. Mines degree: mining and earth systems engineering. Teaches Explosive Engineering I, Explosive Engineering II and Rock Fragmentation. Researches underground and surface mining technologies; construction and geotechnical engineering; blasting, vibration and their

environmental effects; blast resistant concrete/construction materials; industrial explosives; explosive welding; explosive cleanup for power plants; and post-blast forensic investigation. What he tells his students every semester: "If you will do, it will be done."

James F. Ranville MS '88, PhD '92 received tenure as associate professor of chemistry and geochemistry. Both Mines degrees in geochemistry. Teaches Surface Chemistry, Water Analysis and Geochemical Analysis. Researches geochemistry and environmental impact of metals in the aquatic environment, particularly metal-containing nanoparticles, uranium and metals released from abandoned mine sites. What he says about leaving a position at Monash University in Melbourne, Australia to return to Mines: "The beauty of the Colorado Rockies aside, there are numerous sites within a short drive where the environmental impact of metals can be studied. And it is a great place to do environmental geochemistry research—there are great opportunities to collaborate with the U.S. Geological Survey and U.S. Environmental Protection Agency."

Paul M. Santi PhD '95 promoted to professor of geology and geological engineering. Mines degree: geology and geological engineering. Teaches Geological Principles and Processes, Geological Engineering Site Investigation, Field Geology, Case Histories in Geological Engineering and Hydrogeology, Advanced Geotechnics and Advanced Geological Engineering Design. Researches debris flow mechanics and mitigation, landslide and rockfall analysis and mitigation, engineering of weak rocks and geological engineering education. What he says: "The CSM name seems to elicit three types of responses, depending on the listener: "The School of Mimes?" "The School of Minds?" and "Wow, really!?" That's quite a good university, isn't it?"

1988

Juliene M. Benson writes that she and husband, Benny, "have started their own engineering company, ENERGYneering Solutions, Inc. Based in Sisters, OR, they specialize in the design, construction and operation of power plants utilizing renewable fuel sources."

Richard E. Berns is senior embedded firmware developer for Weatherford International. He lives in Conroe, TX.

Scott M. Kelly is director of North American Sales for JWC Environmental in Costa Mesa, CA.

John E. Larson is general manager of global exploration for Zinifex Ltd. in Melbourne, Australia.

1989

Luka Powanga is a professor at Regis University in Denver, CO.

1990

Bruce C. Bunch is a senior petroleum engineer for Williams Production RMT Company in Denver, CO.

Dennis D. Hartwig is a staff drilling engineer for ConocoPhillips Alaska in Anchorage, AK.

Bernhard C. Koch is sole-proprietor of "ProjectConsult-CARTS" (Contract Assignment Research and Technical Services) and renders

services to minerals and metals exploration companies, predominantly active in the western U.S. The office is in Delta, UT.

1991

Herman P. Alendy is mine operations manager for Jamalco in Kingston, Jamaica.

Daniel E. Prairie is a sales engineer for Dexter Magnetic Technologies in Elk Grove Village, IL.

Tanya M. Ten Broeke is owner, medical director and a veterinarian at Gladstone Veterinary Clinic in Portland, OR, treating companion animals, birds and exotics.

David E. Witsken is senior validation consultant for Compliance Concepts International, Inc. in Escondido, CA.

1992

Brett Brunk is manager of enterprise architecture and strategic planning for the aeronautical information group at the Federal Aviation Administration in Washington, DC.

Debra (Meyer) Brunk is vice president for technical services at the Association of Home Appliance Manufacturers in Washington, DC.

Scott A. Gustafson is vice president and office manager of Merrick & Company in Los Alamos, NM.

Natalie C.T. Van Tyne is a lecturer at Colorado School of Mines.

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Alumni

Fast Forward

1993

Bryan L. Roberts is a systems engineer in energy sources R&D for Covidien in Boulder, CO.

Paramita D. Wijaya is country HR manager for PT DuPont Indonesia in Jakarta, Indonesia.

1994

Amy Foster is a failure analysis engineer for DRS Technologies in Dallas, TX.

Michael J. Gordon is an assistant professor at the University of California, Santa Barbara.

Carla M. Gustafson is a project manager for Merrick & Company in Los Alamos, NM.

Chad C. Nickell is an operations manager for air gasses and CO2 Installations - European Platforms and Services for Air Liquide in Vitry-sur-seine, France.

Michael W. Patton is principal engineer of underground projects for the Kennecott Utah Copper Corporation in Magna, UT.

Ted W. Wurfel is an environmental and safety manager for Chief Oil and Gas in Wexford, PA.

1995

Jeff S. Piquette is an assistant professor in the Teacher Education Program at the University of Southern Colorado in Pueblo, CO.

Michelle R. Strmiska is an AMHS program manager for Intel Corporation in Rio Rancho, NM.

Amadeu Kun Wan Sum is an assistant professor in the Chemical Engineering Department and the co-director for the Center for Hydrate Research at Colorado School of Mines.

1996

J. Sally Bommen is oilfield services training program manager in the Network of Excellence in Training (NEXT) for Schlumberger, Ltd. in Houston, TX.

Robert D. Carlson is vice president of finance and treasurer of CoorsTek, Inc. in Golden, CO.

Jeffrey D. Ensminger is a senior engineer for Commonwealth Technology, Inc. in Alexandria, VA.

Scott Goodwin was married to Katie Medlin on September 22, 2007, near Lake Tahoe in Norden, CA. Scott continues to work for Questar Corporation in Denver, CO.

Covey E. Hall is a maintenance engineer for Nabors Drilling USA in Texas.

Catherine L. Kling is development manager for Renewable Energy Systems Americas in Broomfield, CO.

Michael D. Quinn is customer service manager for Samson Rope in Ferndale, WA.

Jonathan J. Richter is a senior project manager for Rock Well Petroleum International in Denver, CO.

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1997

Scott C. Burbidge is project manager for Alain Dalmau Architects in Pueblo, CO.

Jeannine L. Ernstberger is a project engineer for Leppert Associates in Golden, CO.

Valarie L. (Salaz) Hamilton is a technical account manager for CGGVeritas in Calgary, Alberta.

Amy C. Miller is a project manager, Northern California Pacific - water supply and treatment business class lead for HDR Engineering in Walnut Creek, CA.

1998

Lisa M. Budin is a senior staff engineer for ConocoPhillips in Ponca City, OK.

Emily A. Chastain is a project chemist for AMEC Earth & Environmental in Burnaby, British Columbia.

Kristopher L. Kuhlman is a senior technical staff member for Sandia National Laboratories in Carlsbad, NM.

John S. Law is a seismic geophysicist / interpreter for TGS Nopec in Houston, TX.

Morgan B. Sykes is a project manager for E&A Consulting Group, Inc. in Omaha, NE.

1999

Aaron J. Atherton is district manager of business development for ATCO Noise Management, LLC in Littleton, CO.

Jacob M. Hoban is a project manager for Western Engineering Consultants, Inc. in Brighton, CO.

Jeremiah E. Holland is a senior project engineer for Golder Associates in Lakewood, CO.

Ryan S. Martino is a quantitative programmer for Quantlab Financial, LLC in Houston, TX.

Gordon L. Olson works for St. Mary Land & Exploration Company in Billings, MT.

George Tumur is vice president of mining for Energy Resources in Ulaanbaatar, Mongolia.

2000

Leslie A. Baca is a test engineer III for The Boeing Company at Shriever Air Force Base in Colorado Springs, CO.

Scott C. Bennett is a sales engineer for FL Smidth Minerals in Belmont, Australia.

Richard E. Kopp is a manager for Accenture in Denver, CO.

Kenneth V. McCorkell is a project manager responsible for software testing for Perficiant Inc., located in Denver, CO. He lives in Hangzhou, China, about two hours south of Shanghai.

Gregory R. Stowers is a staff engineer for Southwestern Energy Company in Houston, TX.

Timothy M. Taylor is a field application engineer for Gates Corporation in Broken Arrow, OK.

2001

Brianna G. Atherton is a supervising discipline engineer - process for URS Washington Division in Denver, CO.

Hoyt A. Brown is a senior project manager for El Paso Corporation in Houston, TX.

Robert S. Capps received his Juris Doctorate degree from the University of Akron School of Law on May 18, 2008.

Michael R. Grey is a mechanical design engineer for Weatherford International in Houston, TX.

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Profile

Poised to Help Grow the U.S. Nuclear Energy Portfolio

U.S. nuclear energy is likely to grow rapidly over the next decade, and AREVA, the world's largest nuclear energy technology provider, is expected to play a major role in this growth. If so, then as strategy director for AREVA's North American division, Mari Angeles Major-Sosias '85, MS '92 could play a key role in reshaping the country's nuclear energy industry. Supported by a team of strategists representing AREVA's key business operations in nuclear fuel production, spent fuel management, reactors and service, and power distribution and transmission, as well as specialists in communications, government relations and corporate marketing, she interprets the continent's energy landscape, identifies opportunities and formulates a strategy that connects the dots. "That's the part of my job I like the most," she says, "taking the pieces of the puzzle and making a complete picture." One solution that recently emerged out of a collaboration between her strategy group and the enrichment business unit is the multi-billion-dollar uranium enrichment plant being built in Idaho that is slated to open in 2014.

A regionally coordinated approach like this is new for AREVA. Until 2006, the French company's numerous North American businesses functioned separately and reported directly to Paris. Now a single North American umbrella corporation, AREVA Inc, coordinates with Paris and helps bridge the gap between the two cultures. "That is a critical part of my job," said Mari Angeles.

Another critical part is building a strong case to support her recommendations. Often months of work will go into research and planning before a proposal is sent to Paris. If they are given the green light, the project is implemented by a dedicated group within AREVA Inc. "It's a feeling similar to having a child, raising him to succeed, then sending him off to college to see if he can make it in the real world," Mari Angeles jokes.

This wasn't the career Mari Angeles envisioned for herself as a 20-year-old living in Golden. She earned a bachelor's in geophysical engineering with a minor in geology and planned on pursuing a career in the oil industry. But with crude at \$11 per barrel when she graduated in 1985, her options were limited.



After a couple of years working as a geophysicist, she returned to campus for a master's in mineral economics. While pondering a thesis topic, she began working for a Denver-based company doing market analysis on rare earth and specialty metals. This exposure led to her thesis on niobium. After graduating in 1992, she continued analyzing rare earth metal markets, with an increasing emphasis in uranium. In 1997 she joined the Nuclear Energy Institute in Washington, DC. Two years later she moved to U.S. Enrichment Corporation, formed when the Department of Energy privatized its uranium enrichment operations. Here she was tasked with managing the disposition of large inventories of uranium inherited from DOE into the global market without adversely impacting the global market.

Although equipped with an intimate knowledge of the global uranium market, her move to AREVA Inc. as director of strategy in 2006 meant understanding a much wider landscape, including uranium mining and enrichment, reactor construction and service, spent fuel recycling and storage, and power distribution and transmission: "It was a big eye opener," she admits.

On the other hand, she found it easy to adapt to the culture of a multinational company operating in 41 countries. With a Spanish mother and a diplomat father from Trinidad and Tobago, she grew up in many different countries and speaks four languages fluently. "I spoke English with my father and always studied in either British or American schools. Of course I spoke Spanish with my mother at home. And growing up mostly in Brazil, I learned Portuguese. French was my 'second language' through school, and at Mines my roommates were from France and Belgium, so I heard French all night long," she said, laughing.

She's enthusiastic about her company. She speaks of the AREVA Way, a corporate statement that defines a commitment to sustainable energy solutions. And she describes a sense of mission among those who work for AREVA to offer the world CO2-free energy solutions, and not just nuclear: there's a growing emphasis on wind and biomass.

She's similarly enthusiastic about Mines, speaking wistfully of playing intramural soccer and working to make International Day a significant annual campus event. This interest was fanned recently when she learned of Mines' nuclear engineering program during an alumni event in Washington DC. Told that the program would span the entire fuel cycle by combining the diverse expertise of departments across campus, she was impressed. "It mirrors just how AREVA is structured," she said. "I was so excited I almost dropped my drink!"

Mari Angeles lives in Maryland with her husband Gary, a salsa musician and teacher. Their son, Alejandro (Alex), graduated high school this year and is now a freshman at Oswego State University of New York.



"My career has been everything they said it would be...and much more."

Nalita, Field Engineer

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As a field engineer, Nalita and her crew work at the client wellsite performing services that will improve the knowledge and performance of the reservoir. Nalita holds a BS in Electrical Engineering from Colorado School of Mines.

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Success without boundaries

Steve Grigel '01 relocated from Alaska and now lives in downtown Golden with his wife, Kaycie (see Weddings). Steve is a project engineer with Jacobs Engineering.

Erin (Kock) Lake '01 is a geophysicist for Occidental Petroleum of Qatar, in Doha, Qatar (see Class of 2029).

Matthew P. Lott is a firefighter and EMT for the Tucson Fire Department in Tucson, AZ.

John M. McLaughlin is a reservoir engineer in oil and gas lending for Macquarie Bank Limited in Houston, TX.

Jacob S. Palmer writes that he "received his PhD from University of Illinois and is now employed at Diamond Innovations in Columbus, OH. **Kemily '99** stays home with their two beautiful daughters Katie (2002) and Anila (2005)."

Richard P. Spainhour is a lieutenant colonel and a strategic information research analyst for NATO in Norfolk, VA.

Joshua J. Viets is a senior reservoir engineer for ConocoPhillips UK in Aberdeen, Scotland.

Kevin M. Walters is an associate for Exponent Failure Analysis Associates in Menlo Park, CA.

2002

Aaron R. Frahm is a mechanical engineer for Stone & Webster Inc., a Shaw Group Company, in Centennial, CO.

Kazuhiro Kawahata is a senior planning engineer for Newmont Mining Corporation in Carlin, NV.

Julia M. Ventker is a staff engineer for LT Environmental in Arvada, CO.

Alexandra Wayllace is a lecturer and laboratory coordinator in the Engineering Division at Colorado School of Mines.

2003

Abigail S. Bazin is an environmental engineer for AMEC Geomatrix in Seattle, WA.

Jessica G. Begay is a senior process engineer in the Washington Division for the URS Corporation in Denver, CO.

Lisa M. Billy is a power system planning engineer for Tri-State Generation & Transmission in Westminster, CO.

Jon M. Collis is an assistant professor at Colorado School of Mines.

Scott N. Hodgson is a mechanical engineer for Shaffer Baucom Engineering and Consulting in Lakewood, CO.

Robert Jones and **Bernadette DeCianne** were married on April 21, 2007, in Lakewood, CO.

2004

Emily A. Durham is an account representative for Halliburton in Denver, CO.

Mark M. Montano is a design engineer I for Merrick & Company. He lives in Centennial, CO.

Jenelle M. Morris is an environmental, health and safety manager for Sundyne Corporation in Arvada, CO.

Grant E. Scott is a process engineer for Samuel Engineering in Greenwood Village, CO.

Jennifer M. Tafoya is an associate engineer for Luca Technologies in Golden, CO.

Todd P. Weaver is a maintenance engineer for Lafarge North America in Westminster, CO.

2005

Justin D. Anderson is a mining engineer in the Washington Division for URS Corporation in Denver, CO.

DeaZhan K. Begaye is a field engineer for Pathfinder Energy Services in Farmington, NM.

Matthew H. Hansen is an aviation engineer for CH2M Hill in Englewood, CO.

Robert A. Larson is a graduate student at Colorado School of Mines.

Jessica L. Olson is a project manager for Vulcan Materials Company in Naperville, IL.

Andrew J. Ramcharan is manager of technical services for Geovic Mining Corp. in Grand Junction, CO.

Lindsay A. Rothfelder is a NGL planner for the BP Carson Business Unit in Carson, CA.

John W. Thompson is project leader for Rio Tinto in Weipa, Australia.

Krista Burke Thompson is a mining engineer for Rio Tinto in Weipa, Australia.

2006

Regina M. Caputo is a graduate student in the Department of Physics & Astronomy at SUNY Stony Brook in Stony Brook, NY.

Lisa A. Costanzo is a geologist for EOG Resources in Denver, CO.

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CSM Foundation Inc. Linda M. Landrum at (303) 273-3142



Class of 2029



Erin (Kock) Lake '01 and her husband, Steven, announce the birth of their daughter, Wynne Pierson Lake, born on January 30, 2008, in Doha, Qatar.



Abigail Elizabeth Piggott (Abby) and Wyatt James VanHorn met for the first time in Colorado Springs over Labor Day weekend 2008. Abby is the daughter of **Brad '02** and **Leslie (McCandless) '02 Piggott** and was born February 25, 2008. Wyatt is the son of **Chad '02** and **Karen (Martin) '03 VanHorn** and was born March 7, 2008.



Jacob Perkins '00 and his wife, Lela, would like to announce the birth of their second child, Lydia Abigail, born on August 21, 2007.



Lars Boehnke '05 and his wife, Renee, proudly announce the arrival of their daughter, Myla Hailey, born on April 17, 2008.



Anders '02 and **Rebecca '03 Rasmussen** would like to announce the birth of their second child, Hailey Noël Rasmussen born on December 17, 2007. She is pictured here with her big brother Hayden.

Marieke W. Gaudet is a geologist for Occidental Oil and Gas Corporation in Long Beach, CA.

Grant W. Newton is a project engineer for Conti Enterprises in South Plainfield, NJ.

Manuel L. Padilla is a senior geologist for Galway Resources in Deming, NM.

Matthew J. Vahsholtz is a field engineer for BJ Services Company in Grand Junction, CO.

Angela Zamarron is a materials engineer in the Weapons Division for NAVAIR in China Lake, CA.

2007

Gilbert Gutierrez is a geologist for exploration oil division for Ecopetrol in Bogota, Colombia.

Kristin J. Illi is a project engineer for Anheuser-Busch in St. Louis, MO.

Marcelina Y. Martinez is a technical staff member for the Los Alamos National Laboratory in Los Alamos, NM.

Daniel P. McCorkell is an operations engineer for Devon Energy Corporation in Oklahoma City, OK.

Nathaniel E. Morgan is an industrial engineer for Ametek - ISC/VIS in Grand Junction, CO.

Monica A. Teff is a metallurgist for Firth Rixson-Schlusser Forge Company in Rancho Cucamonga, CA.

2008

Nader A. Alarfaj is a marketing analyst for the Saudi Aramco Company in Dhahran, Saudi Arabia.

Jessica F. Davis is a research assistant II for the Center for Gait and Movement Analysis at Children's Hospital in Aurora, CO.

Teresa Lynn D'Eletto is an operations engineer for Devon Energy Corporation in Oklahoma City, OK.

Amanda L. (Catalano) Edeen is a metallurgical engineer for Dakota Gasification Company in Bismarck, ND.

Stephen M. Immel is an engineer for Technip, USA in Houston, TX.

Nikole C. Muckelroy is a graduate student in Metallurgy and Materials Engineering at Colorado School of Mines.

Daniel W. Mulqueen is a research scientist for Biomass Energy and Carbon in Golden, CO.

April M. Nelson is an associate engineer for HighMount Exploration & Production in Houston, TX.

Frederick C. Ruff is a project engineer for Newmont Mining Corporation in Golconda, NV.

Angela Targhetta is a technology development engineer for Aernnova Aerospace in Madrid, Spain.

Alyssa M. Wedgwood is in the Management Development Program for Precision Castparts Corporation. She lives in Muskegon, MI.

Michael Wray is a metallurgist for Freeport-McMoRan Copper & Gold Inc. in Arizona.

Passings

To live in hearts we leave behind
is not to die.

—Thomas Campbell 1777-1844



FLORENT DAVID BAILLY '59 died on June 28, 2008 in Pagosa Springs, CO. At Mines he earned a degree in geology. A full 23 years later, he attended Denver Seminary, where he earned his master's of divinity in 1982. From that time until his retirement on Christmas Eve, 2006, he served as pastor of Pine Community Church in Pine Grove, CO. He

was a devout Christian and a loving husband, father, grandfather, brother and uncle. He is survived by his wife, Mary; his daughters, Deborah and Rebecca; his sister Elizabeth Glenn; and three grandchildren.



PETER ROBERT BUNNING '99 of Houston, TX, passed away on Wednesday, March 12, 2008. Born in 1977 in Rock Springs, WY, he graduated from Rock Springs High School in 1995. He graduated with honors from Mines in 1999 with a bachelor's in engineering, electrical specialty. While at Mines he was a member of Blue Key, the varsity golf team, and was responsible for the lighting of the "M."

He was employed by several engineering firms in the Houston area and was responsible for designing components for NASA and the International Space Station. At the time of his death he was employed as an electrical engineer for Agar Corporation. He enjoyed spending time with family and friends, being outdoors, writing poetry, fishing, camping and golfing. He was also an avid dancer and enjoyed card games. Peter is remembered by those who knew him as loving, generous and caring. He is survived by his mother, Clara Bunning; his father, Peter J. Bunning, and his wife, Rose; his sisters, Karen Moon and Marla Johnson; and his fiancé Elizabeth Harwood.



WALTER L. CROW '41 died January 21, 2008. Born in 1918 in Monroe, WI, he grew up in Denver and graduated from East High School. After completing his degree in mining engineering at Mines, he joined the Navy and completed officer training at the Naval Academy in Annapolis. It was while he was attending the Naval Academy that he and Mary Estelle Fitzsimmons were married. After completing submarine school,

he was assigned to the USS Gabilan for the remainder of World War II. After the war, Walter became a sales engineer in explosives for DuPont Company. He then switched careers by purchasing a chicken hatchery in Longmont, CO, where he lived and worked until the mid 1950's. After turning the chicken ranch over to his younger brother, he returned to Denver to become a sales

engineer with Colorado Fuel & Iron. He later moved to A.R. Wilfley & Sons where he worked in the same capacity. In the early 1970's, he and his wife moved to Tucson, AZ, where he opened Crow Company, distributing Wilfley pumps, industrial pipes and valves. He retired in the 1980's in Summerfield. His favorite passtimes were traveling, boating, marquetry and volunteer activities. In 2004 after his wife's death, he moved to West Hills Village, Portland. He is survived by his sons Walter and John; three grandchildren; and two great-grandchildren.



JOHN P. DENNY '42 of Shillington, PA, died on June 11, 2008. Born in Pittsburgh in 1921, he was raised in Denver, CO. While at Mines, he was a volunteer for the US Army Air Corps and an ROTC Student. After graduating from Mines with a degree in metallurgical engineering, he served his country as an engineering officer in the Southeast Asian theater during World

War II. Following the war, he was married to Jane Dawson in Glenwood Springs. After a brief time working for the Battelle Institute in Ohio, he and his wife moved to Salt Lake City where he earned a doctorate in metallurgy at the University of Utah. He then went on to work for General Electric, where he researched metal applications for products such as jet engines. Leaving GE, he worked for Beryllium Corporation, where he helped pioneer developments of products used in space exploration, including Project Mercury, the first US manned orbiting space program. Over the course of his career, he earned several patents and authored a number of technical publications. He enjoyed golfing, fishing, working on computers and reading, and was a devoted husband and father. After his retirement he and Jane moved to St. Charles, where he was an active volunteer in the Parkside Meadows Retirement Community. He is survived by Jane, his wife of 62 years; his sons Bob and Ed; his daughter Kathy Holland; eight grandchildren and four great-grandchildren.



CHARLES RINGER FITCH '49 of Olympia Fields, IL died on March 1, 2008. Charles graduated from Mines with a professional degree in mining and shortly thereafter married Valerie Rose. He went on to become the owner of Charles Ringer Co. He served on several boards, including the South Chicago Savings Bank/Advance Bank, Trinity Hospital and South Chicago YMCA.

He was also a member of Triluminal Lodge #767 and Medinah Temple Ancient Arabic Order of the Nobles of the Mystic Shrine. He also served as a 10th Ward republican committeeman, and was a sergeant in the U.S. Army in Europe during World War II. He

fought in the Battle of the Bulge and was a recipient of a Silver Star and Purple Heart. He later went on to serve in the Korean War as a 2nd Lieutenant. He is survived by his daughter, Glenna Elvery; two grandchildren; and one great-grandchild.



C.M. "CAM" HALES '48 of Columbia, TN, died on June 12, 2008. He was born in 1921 near Boaz, AL, where he graduated from Boaz High School and Snead Junior College. After his father's death during the Great Depression, he helped his mother run the

family farm. In World War II he served the US Army Air Corps as a pilot in the European theatre, attending Mines after being discharged. During this time he married Virginia Ann Weaver in San Antonio, TX. In 1952 he began working for Monsanto Company in Columbia, TN, where he worked for nearly 35 years. He was in charge of the plant's surface mining operation for a number of years, and in 1986 he retired from his position as the head of the mining department. While in Columbia he served in various civic organizations, and was known as a loving husband, father, grandfather and friend. He is survived by his sons Thomas and Randy; his daughter Ann Hales; five grandchildren; and two great-grandchildren.



PAUL D. HINRICHS '53 of Ventura, CA, died on May 21, 2008. He was born in 1932 in Denver, CO. While earning his degree in geological engineering from Mines, he served as the president of the Beta Theta Pi fraternity, and played varsity basketball. After graduating, he began his career as a production geologist with Shell Oil Co. in the Delaware Basin, Wason Field in Texas, and

later the Altamont Field in Wyoming. He then joined Royal Dutch Shell in 1973 as chief development geologist for several oil fields in Oman and the North Sea. In 1978 he returned to Denver and joined Petro-Lewis Corporation as chief geologist/vice-president in charge of development of new properties. More recently he conducted exploration and development in Guatemala, California and Siberia. He retired from Benton Oil & Gas Co. in 2001. He was a lifelong member of AAPG and enjoyed golf, traveling, cribbage and sports trivia. He is survived by his son David; his daughter, Kit; his brothers Charles and Louis; and two grandsons.



CRAIG R. HUTCHINSON '64 of Falls Church, VA, passed away on October 30, 2007. Born in 1942, he graduated from Mines with a degree in mathematics and later earned a master's in mathematics from the University of Arizona. For more than 38 years he taught social, exhibition and competitive dancing. Initially teaching

ballroom and night club, he later taught all styles of swing. As a retired lieutenant colonel from the U.S. Army Corps of Engineers, he formed the United States Military Academy Swing Dance Club at West Point. The author of *Swing Dancer*, a *Swing Dancers Manual*, he wrote over 30 articles on swing dancing, produced four

swing dance instruction videotapes and held numerous positions in various dance organizations. He taught Swing to servicemen in Germany, South Vietnam, Australia, Japan, and Taiwan. He married his long-time dance partner Lucy Renzi. He received a purple heart for his service in Vietnam and was buried in Arlington Cemetery. He is survived by his wife Lucy, and two stepchildren, Josh Renzi and Tara Touzeau.



RALPH D. JACOBS '43 died on February 27, 2008. Born in Denver, CO, in 1920, he graduated from Mines with a degree in petroleum engineering. While at Mines he was a member of the Sigma Alpha Epsilon fraternity. During World War II he served as a lieutenant in the US Navy in the South Pacific. After working for several companies

in Colorado and Kansas, he joined Bechtel Corporation in 1965 working for their pipeline division until 1981. During these years he was involved in numerous major pipeline projects around the world, including Australia, Southeast Asia, Iraq, Turkey, the Netherlands, Canada, France, Germany, Britain, and Norway among others. In 1981 he retired from Bechtel and joined CB Lester & Associates in Longview, TX, as a consultant. He worked primarily in Turkey and Iraq until 1986, when he retired. He and his wife then moved to Mendocino, CA, where they enjoyed playing golf and taking art and computer classes at the local community college. He returned to Golden in 1993 to attend his 50th Class Reunion, which he greatly enjoyed. He is survived by his wife, Rosemary.



WILLIAM KELSAY '58 of Calgary died on June 6, 2008. Born in 1936 and brought up in Anthony, NM, he attended Gadston High School, leading the football team through four undefeated seasons as their starting quarterback. He attended Mines with an athletic scholarship, during which time he became a member of the Kappa Sigma fraternity. The same year he

earned his degree in petroleum engineering, he married his high school sweetheart, Berwyn McKinney. After serving in the Army Corps of Engineers, Bill went on to a career in the oil industry. Starting as a roughneck, he worked his way to president of Jennings Drilling and retired from Lynx Services in 1992. He served as president of the Canadian Association of Oilwell Drilling Contractors and chaired the CAODC committee that produced the first edition of the *Drilling Manual* and the first edition the *Standard Drilling Contract*, for which he was awarded an honorary lifetime membership. He was also a member of the Association of Professional Engineers; the American Institute of Mining, Metallurgical and Petroleum Engineers; the Canadian Institute of Mining, Metallurgy, and Petroleum; and the Society of Petroleum Engineers. An athlete, he loved to ski, golf and fly-fish. He also enjoyed music and was skilled at intricate needlepoint work. He was known for a passionate joy for life and a gift for storytelling. He is survived by his daughters, Connie Hendrick and Kim Kelsay; and four grandchildren.



MARIO MARCANIO '56 of McMurray, PA, died on June 5, 2007. Born in Rochester, NY, he served three years in the Army during World War II. Ever since he attended pre-engineering courses at his high school where his chemistry professor had recognized his interest in mineral science and told him about Mines, Marc had been determined to attend. And in 1950 he hitchhiked across the country from

Rochester to Golden to do so. When asked about this intrepid step, he replied, "After three years in New Guinea what's to be afraid of?" In 1954 he met and married Carolyn McCoy, and the family then moved into Prospector Park for the next two years. He graduated from Mines with a degree in metallurgical engineering. While at Mines, he was a member of the Theta Chi fraternity. After graduation he began his career as a process metallurgist and materials engineer at Allis Chalmers Mfg. Co. Subsequently he worked as a metallurgist in the steel industry and in nuclear power. Throughout his life he visited Golden many times, most recently in 2006 for his 50th Reunion. He and his family were thrilled to attend and were inspired by watching students receive their degrees. He is survived by his wife, Carolyn; his sons, Michael, Joseph, Patrick and Peter; his daughters, Christine Romance and Natalie Marciano; twelve grandchildren; and one great-grandchild.

JOHN D. McIVER '50 of Mesa, AZ, died on April 30, 2008. After graduating from Fort Collins High School in 1942, he attended Yale where he studied mechanical engineering. From 1943 until 1946 he served in the Air Force, primarily in the Pacific Theater. He came to Mines in 1946, where he earned a degree in metallurgical engineering and was awarded the H.O. Bosworth Award in Metallurgy upon graduation. He then began a long and successful career in the copper industry, going to work for Kennecott Copper Corporation, in Salt Lake City, UT, immediately after graduation. He transferred to Kennecott's refining division in 1957, where he remained until 1969. He then went to work for Newmont Mining for two years before joining Magma Copper Company in Arizona as the refinery superintendent. He remained with the company for 18 years before retiring. John was a member of American Institute of Metallurgical Engineers and the Society of Mining Engineers. He remained actively involved with the Colorado School of Mines Alumni Association and the Class of 1950, and in 1997 organized a highly successful class reunion Caribbean cruise aboard the small supply ship, *Amazing Grace*. He is survived by his daughter, Helen; his sons Jack, Richard and Tom; and his brother James.



LAWRENCE S. MELZER '39 of Midland, TX, died on April 21, 2008. Born in 1915 and brought up in Woodworth, ND, he began college at North Dakota State, but transferred to Mines when a professor mentioned he should pursue math and engineering. After graduating with a degree in petroleum engineering, he began working in the

oil and gas fields of Texas. On a visit to his mother's hometown, he met Dorothy Brooks of Kansas, whom he married less than a year later. His professional career began at Stanolind Petroleum. In the early fifties he began work for Statex Petroleum where his team discovered several new fields. Deciding to strike out on his own, he acquired and ran the Kroenlein's Geological Service. Larry and his family were very active members of the Memorial Christian Church, where he served as chairman of the board in the sixties. A generous supporter of Colorado School of Mines, he was also a loyal member of the Exchange Club and served on the suicide prevention hotline. His hobbies included golfing, bird hunting, watching sports, reading and helping others. He is survived by his wife, Dorothy; daughters Betty Moore and Martha Savage; son Stephen; nine grandchildren; and twelve great-grandchildren.



THOMAS OLIVER MOHR '56 of Saint George, UT, died on May 10, 2008. Born in Ft. Worth, TX, in 1931 the son of a geologist, his father's work took the family to Chile when he was aged 8. He graduated high school from Wentworth Military Academy in Lexington, MO, and entered Mines the following autumn. After two years, he enlisted in the Marine Corps. He then returned to Mines to earn a degree in petroleum engineering. His work took him to Saudi Arabia, Peru, Venezuela, Argentina and Scotland. Thomas loved being an engineer and held Mines dear to his heart. He is survived by his wife, Rosemary, and two sons.



KARL WILLIAM MOTE '49 died at his home in Spokane, WA, on April 4, 2008. He was born in Plainview, NE, in 1927 and grew up in Denver. He graduated early from South High School and entered Mines in the spring, completing his freshman year before enlisting in the Navy. In 1946 he was discharged from the military just after finishing boot camp. Returning to Mines that fall, he went on to graduate with a degree in metallurgical engineering. He began his professional career at US Steel in Provo, UT, that same year. By 1966 he was working from corporate headquarters in Pittsburgh, PA, managing international ore shipments and distributions from the domestic smelters in the east and south. In 1976, he assumed the newly created position of executive director of the Northwest Mining Association. He helped the organization grow six-fold in size to 3,000 members and was a strong voice on issues affecting the mining industry. He is survived by his wife, Elva; his daughters Karen, Kris and Kathy; his sons Karl and Kelly; ten grandchildren; and one great-grandchild.



HERBERT POITZ '41 of Houston, TX, died on December 26, 2007. After graduating from Mines with a degree in petroleum engineering, he joined the U.S. Army and was later honorably discharged as a 1st lieutenant in 1946. He went on to become a petroleum engineer with Shell Oil Company and retired

after 37 years. His favorite activities included hunting and fishing, traveling and golf. He also enjoyed his monthly retirement group meetings. He is survived by his wife of 63 years, Ilene; his daughter, Diane Edwards; and one grandchild.

HOWARD K. SCHMUCK '40 of Arvada, CO, died on January 21, 2008. Born in 1918 he grew up in Denver, CO, and graduated from North Denver High School. He graduated from Mines with a degree in metallurgy. Until entering the US Army, he worked as a metallurgist for Alcoa in Buffalo, NY. Because of his job, he was eligible to opt out of service, but instead served for four years overseas as an ordnance officer in the Middle East and Europe during World War II. Following discharge, he returned to his metallurgical career and worked for Union Carbide in Houston, TX. He returned to Colorado to work for Colorado Fuel & Iron as a sales engineer/manager in mining products, including grinding media and roof bolts. As part of client calls, he frequently went into underground coal and hard rock mines throughout the Rocky Mountains to install and test roof bolts. These efforts and his technical articles for trade publications helped bring about the adaption of roof bolts by the mining industry. He was a lifelong outdoorsman, enjoying hunting and fishing—especially fly-fishing on the Colorado River. He is survived by his sons Carl, Gary and Gordon, and his daughter, Adrienne.



FREDERICK L. STUBBS '54 of Tucson, AZ, died on February 28, 2008. Born in Lubbock, TX, he served two years in the US Army Air Force before coming to Mines to begin his degree in metallurgical engineering. In 1948 he married Rose Mary Dawkins. After graduating from Mines, he enjoyed four years working on the Gold Coast of Australia with

Rose Mary. In 1958 the family moved to Tucson, where he began teaching at the University of Arizona. In later years he worked for the Arizona Bureau of Mines and Phelps Dodge. His final and happiest retirement came in 1982 when he built a machine shop in which he designed and manufactured prototypes and provided maintenance services for the woodworking industry in Tucson. He is survived by his sons Scott and Roger; three grandchildren; and one great-grandchild.



JERRY JOHNSON SWIFT '55 of Bethesda, MD, died on June 10, 2008. Born in Columbus, OH, he graduated from Mines with a degree in geology. He then joined the Army Corp of Engineers in Germany for a tour of duty. Returning from Europe, he began working on a wild cat oil rig in West Texas. Then, as an engineer for the Civil Service, he built bridges, roads and

dams in Oklahoma. He received a master's degree from Iowa State University in health physics and, in 1970, a PhD from Catholic University in nuclear engineering with a specialty in radiation safety. He worked for two years in Germany for the Institute for Reactor Sicherheit. After returning to Washington, DC, he took a

position with the Environmental Protection Agency where he was responsible for reviewing nuclear power plant impact statements and making comments to the Atomic Energy Commission. He joined the Department of Energy, where he reviewed nuclear programs and prepared reports as part of the Technology Assessment Division. His specialty was nuclear waste management programs. In the mid-1980s, he took a job with the Nuclear Regulatory Commission's Office of Research. He remained there until he retired in the late 1990s. While at the Nuclear Regulatory Commission he worked on the recovery from the Three Mile Island nuclear plant accident and later managed research on the incident. He enjoyed sailing in the Chesapeake Bay and hiking in Potomac Falls Park. He is survived by his children, David Swift, Christina Dodd, Jennifer Houser and Steven Swift; and nine grandchildren.



MARVIN LEE WAGONER '51 of Katy, TX, passed away February 11, 2008. He was born in 1925 in Ellis County, KS. Having served in the U.S. Army Air Corps during World War II, he came to Mines after being discharged to earn his degree in geophysics. After graduation, he worked for Geophysical Services in Dallas, TX, which took him all over the United States and Mexico. He

was subsequently employed by the Chevron Corporation and the Gulf Oil Company in Casper, WY. He is survived by his wife Crystal; his son, William; his daughter, Cynthia L. Smith; his brothers Norman and Darrell; his sisters Eluena Walter and Annalie Runge; four grandchildren; and one great-grandchild.



W. STANLEY WIMBERLEY '53 of Kearney, NE, died November 4, 2007 in Houston, TX. He graduated from Mines as a petroleum engineer and was employed by Texaco after serving two years in the US Army in Japan. Later he joined Rockwell International in Kearney as quality assurance manager. He also worked for

American Petroleum Institute in Dallas before joining Petroleum Professionals International, a consulting firm in Houston. He was a member and past president of Sertoma in Kearney, NE. In addition to love and devotion to his wife and family, he had a passion for music. He served as choir director in several churches throughout his life and especially enjoyed barbershop music—he helped form the Hardrock Harmonizers quartet from among members of the Glee Club attending the All-Alumni Banquet held over Reunion weekend. He is survived by his wife of 50 years, Carole; his son, Lane; his daughter, Dana; and four grandchildren.

Also In Memoriam

Dexter C. Hatch '51	April 13, 2008
John C. Kingston '35	November 13, 2006
William N. Miner '49	October 25, 2007
John R. Riter '56	June 15, 2007
James L. Shore '53	March 21, 2008

Nuclear Power – An Energy Policy Must!

By Newell Orr '54

From 1950 to 1980, more than 110 nuclear plants were built in the U.S.—since then, not one. The 104 plants that remain in operation generate 20 percent of all electricity consumed in the U.S. In 1977, President Carter, concerned about plutonium getting into the wrong hands, banned the recycling of spent nuclear fuel rods, and in so doing magnified the quantity of nuclear waste we produce. We now store more than 58,000 metric tons at 65 locations. To meet environmental demands, storage facilities must be secure for 10,000 years. However, we can now, with new technologies, recycle this waste, generating enough energy to more than pay for the process. In so doing, we reduce the volume of radioactive material for long-term storage to a fraction of the original amount and the resulting material need only be secured for 300 years.

Although the Three Mile Island leak resulted in no lives lost, it created a great deal of fear. These feelings were compounded by the films *The China Syndrome* and *Silkwood*. The Chernobyl disaster was tragic and much more significant, but it is important to remember the accident was due to poor operational and safety standards, a botched and unauthorized test by engineers and poor reactor design. Since then, the design, construction and operational standards of nuclear plants have progressed considerably; in the past 25 years, no serious accidents have occurred anywhere in the world.

Globally, there are now 439 nuclear plants, which provide about 16 percent of the world's power. In France, 59 plants supply 77 percent of the power. Because France reprocesses its waste, the volume of radioactive material that must be put into long-term storage is relatively small. Other countries operating nuclear plants include Great Britain, Germany, Spain, Sweden, Finland, India, South Korea, Mexico, Russia, Czech Republic, Brazil, Pakistan, South Africa, Slovakia, Slovenia, China, Japan and Taiwan.

AREVA, the leading designer and builder of nuclear plants worldwide, is developing advanced reactor technology that could drastically reduce the quantity and radioactive half life of nuclear waste. The company likes to point out that 96 percent of the material in used fuel is reusable. By feeding the U.S.'s accumulated

nuclear waste into such technology, a great deal of energy could be generated and the volume could be reduced to just 4 percent of the original. Even with existing technology, when nuclear waste is reprocessed in fuel and reused, the result is more energy and about one quarter the waste. Concerns about the plutonium manufactured during reprocessing are understandable. However, AREVA has successfully developed highly secure mechanisms for handling the material, one of which is that they stop the refining process well short of making weapons-grade plutonium.

Clearly the problem of what to do with nuclear waste is not nearly as hard to solve as the public believes. On the other hand, the benefits of nuclear power are numerous: there are no CO₂ emissions (France has reduced its CO₂ emissions by 25 percent since 1980), and the cost of nuclear power is less than coal.

The list (above) includes the 13 countries that have achieved the greatest increase in the amount of nuclear power generated during the decade 1992–2002.

The world is realistically and sensibly moving toward nuclear power. For emotional, political or possibly irrational environmental reasons, the U.S. is dragging its heels even though it has the most nuclear experience. It is time to capitalize on this potential to our tremendous benefit.

Sources: *Journal of Metals*, *Wall Street Journal*, *Barron's*, *Readers' Digest*, IEA

China:	4,590%
Brazil:	732
Pakistan:	244
India:	195
Mexico:	149
South Korea:	111
Czech Republic:	48
Slovakia:	47
Slovenia:	41
Japan:	39
South Africa:	29
France:	29
USA:	26

(Source: International Energy Agency)



Last Word is a place for alumni and other members of the Mines community to articulate their opinions. Its content does not necessarily reflect the opinions of the Colorado School of Mines or the alumni association. We have made an attempt to fact check, but readers are advised to independently confirm the veracity of claims made in this and other Last Word articles.



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