

Laser science reveals ultrafast phenomena—chemicals reacting, crystals forming

Nanorings—near diamond strength *and* flexible

Scoggins sets course for the years ahead

# Mines

Colorado School of Mines Magazine



## The Quiet Crisis

Insufficient science and engineering education threatens U.S. “intellectual security”

Mark your calendars for Reunion Weekend!

# MAY 9-12, 2007



Celebrate your memories of Mines with your fellow classmates from

**1932, 1937, 1942, 1947, 1952, 1957, 1962,  
1967, 1972, 1977, 1982, 1987, 1992, 1997 & 2002**

Beginning in 2007, the 5th through 45th Reunion classes will also be celebrating with invited neighboring classes on either side.

**1961 and 1963 • 1966 and 1968 • 1971 and 1973  
1976 and 1978 • 1981 and 1983 • 1986 and 1988  
1991 and 1993 • 1996 and 1998 • 2001 and 2003**

Go to [www.alumnifriends.mines.edu/reunion](http://www.alumnifriends.mines.edu/reunion) for current reunion information, including announcements about program particulars.

**Academic Department Reunions  
Minority Engineering Program Reunion  
Picnic on Kafadar Commons  
Class Dinners  
Geology Trail Walk with Bob Weimer  
And much, much more**

**Faculty Symposia  
Mahdi Obeidi '67, Iraqi author of *The Bomb in My Garden*  
A Night of Comedy  
Tours of the New Recreation Center  
Personal and Professional Development Programs**

For more information on Reunion Weekend, contact:  
Colorado School of Mines Alumni Association  
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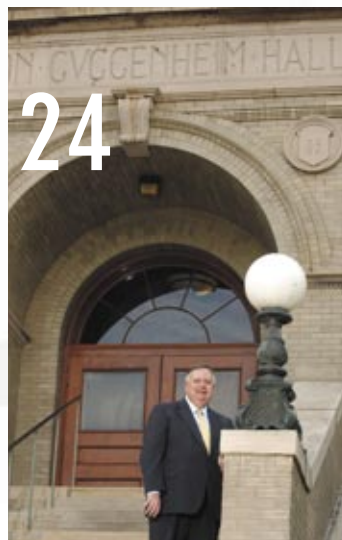
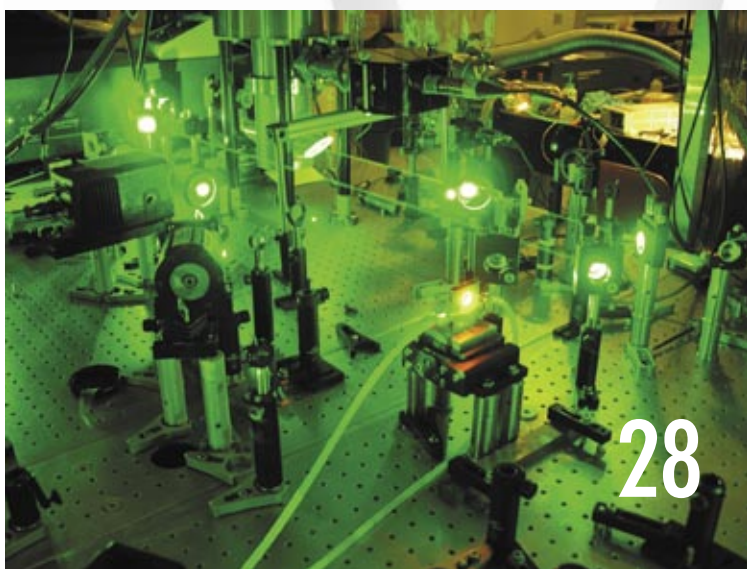
**A gift to The Mines Fund in honor of your reunion carries on the unique Mines experience for generations of future students. Join your classmates to show your belief in the enduring value of a Colorado School of Mines education.**

For more information on the Reunion Class Giving Program, contact:  
Alexis Bloomfield, Reunion Gifts Officer  
Phone 303.273.3144  
[Alexis.Bloomfield@is.mines.edu](mailto:Alexis.Bloomfield@is.mines.edu)



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## Stratton Hall Revisited

I enjoyed the story on Stratton Hall that appeared in the fall 2006 magazine. Several years ago, as part of my antique postcard collection, I obtained a postcard from 1912 of Stratton Hall. Postcards then took only 1 cent to mail.

*James "Jim" Daniel '76*

## Not Buying the Corn

I was quite surprised upon reading this article based on a "scientific" study. In particular, the author's statement that the use of corn instead of plastics would save 800,000 gallons of fuel and eliminate 11 million pounds of emissions. Besides being of questionable authority (I could find no study cited to support these assertions), why does the author think that the 800,000 gallons of gas will not be used by anyone else for any other reason? We all know they will, and as a result, those 11 million pounds of emissions will be produced anyway!

As engineers and scientists, we need to be ever vigilant about these types of erroneous, feel-good statements. Sure, they make us all warm and fuzzy inside, but they do not stand the crucible of critical thought.

Come on guys, this kind of article belongs in a Sierra Club publication.

*Jon Jambor '89*

I would like to respond to your article in the fall 2006 issue of Mines. The article "Field of Dreams: Corn-based plastics have reached the big leagues" reported that "CSM researchers are now working to improve the properties of PLA using new advances in nanotechnology to make the first ever polymeric

nanocomposites based on 100% renewable resources."

Nanocomposites made with all renewable resources such as soybean oil and PLA have been prepared at TDA Research in Wheatridge, Colo., in the late 199's. Much of the work was led by Ron Cook, in collaboration with Silvia Leuben, Manfred Meiser, Georgette Siparsky, and later with Andy Myers. These projects were funded through SBIR programs granted by USDA and NSF.

It would be interesting to find out where the "first ever polymeric nanocomposites based on 100% renewable resources" were prepared. A thorough and accurate historical perspective would serve the readers well.

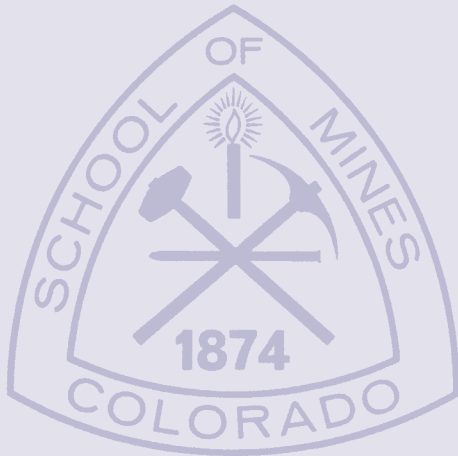
*Georgette Siparsky, PhD '95*

**Editor's note:** We asked John Dorgan, one of the professors at Mines cited in the original article, to address our readers' questions above. He explains: "It should be appreciated that the story running in *Mines* magazine was a reprint of an EPA document developed for a broad non-technical audience. Nonetheless, all of the information provided is technically correct.

"With respect to the issues raised by Jon Jambor, the relevant scientific study documenting the savings may be found in the peer-reviewed journal, *Polymer Stabilization and Degradation*, volume 80, pages 403-418 (2003) in an article entitled, "Applications of life cycle assessment to NatureWorks polylactide (PLA) production." Also, the emissions being saved are not those of burning the fuel—to date, carbon dioxide is not EPA regulated and as such is not an emitted pollutant (a situation bound to change as we address climate-change problems). Rather, the pollution avoidance being realized is in the form of smog-causing volatile organic compounds (VOCs)—these are organic molecules emitted during the production of the plastic material, for example, ethylene or propylene gas that are the monomers used in making polyethylene and polypropylene polymers,

respectively. The lactide monomer used in making the polylactides is a solid up to 93°C and as such has a very low volatility. As for saving fuel so that it can be used for another purpose, this is still helping to meet demand—one might say, 'a penny saved is a penny earned!' Practicing conservation and substitution when and where we can is the fastest and most economic route towards meeting our growing energy and material needs. To summarize, our advances are based on sound science backed up by quantitative calculation and repeatable experiments and are always subject to the scientific peer review process.

"Having sat on Dr. Georgette Siparsky's thesis committee, I followed the work that she and others at TDA Research subsequently completed. To be sure, I checked again with Dr. Andy Meyer at TDA regarding what they have done—he confirmed that the nanofiller used in their composites was boehmite, a mineral that must be mined or synthesized from mined inorganic materials. Meyer describes this filler as, 'certainly not biodegradable or renewable.' A large number of commercial and academic groups have made polymer nanocomposites comprised of a biobased plastic and various inorganic fillers with montmorillonite clays being the most common. The subtlety missed by Siparsky is that our work focuses on (as stated in the article and repeated in her letter) nanocomposites that are 100% renewable. We are accomplishing this important goal by using cellulosic nanowhiskers as the reinforcing filler—these nanowhiskers are about 10 nanometers in diameter and up to 500 nanometers in length; they are easily derived from cotton linter, wheat straw and other under-utilized renewable resources. Cellulosic nanowhiskers are proving to be very effective in increasing heat distortion temperatures and we are now collaborating with the Sealed Air Corporation, a \$4-billion-a-year-in-sales polymer packaging manufacturer, to commercialize these materials. As it stands, we still use 1 part in 10,000 of a tin-based catalyst, so our nanocomposites are in fact still only 99.99% renewable. We continue to work to identify a non-metallic, renewable catalyst that can be utilized, but this is proving a formidable technical challenge. If any Mines alumni have a good suggestion regarding a renewable catalyst to use, or have additional interest in our work, I can be contacted at [jdorgan@mines.edu](mailto:jdorgan@mines.edu)."



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*Mines* is published quarterly by the Colorado School of Mines and the CSM Alumni Association for alumni and friends of the School. *Mines* magazine is a critical communication serving the Colorado School of Mines community. Its mission is to keep readers informed about the School, to further the goals of the School and the Alumni Association, and to foster connectedness.

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](mailto:magazine@mines.edu).

## Dear Readers,

New year. New resolutions. Newly inaugurated president of Mines and several new faces, including one for the magazine!

When we announced that you would be seeing a redesigned magazine, we received a lot of feedback, but the message that most succinctly summarized our thinking was from **Dick Mandel** '53: "Great innovations and ideas! The mantra at a large company (I think IBM) once said that if you have been doing the same thing for six or eight years, then you should examine it, as it is probably not competitive and wrong." While *Mines*, the magazine, is not meant to be competitive in the economic sense, it does compete for your attention and, while there were a lot of things that were right with the former magazine, we wanted to take a head-to-toe shot at making it better and more contemporary.

How did we go about the redesign process? We surfed through many magazines, both commercial and alumni publications. Then the magazine's editorial board, consisting of both alumni and Mines administrators, interviewed several designers and enthusiastically chose Craig Korn—a talented, local professional who also designs the *University of Denver Magazine*. We're excited to debut his clean and classy design with this issue.

What will you find between the covers? This issue includes five feature stories. In December, Mines installed its 16th president, M.W. "Bill" Scoggins. President Scoggins presided over a commencement ceremony at which 111 undergraduate and 135 graduate degrees were granted. At the ceremony President Scoggins shared his observations of, and vision for, Mines (see page 24) and commencement speaker Shirley Jackson, president of Rensselaer Polytechnic Institute and an honorary degree recipient, shared her provocative concerns about U.S. trends in science and engineering education, discussed in her essay, "The Quiet Crisis" (see page 20). President Scoggins, along with his counterparts at Colorado's state colleges, penned an opinion piece for the *Denver Post* called "Transforming Higher Education in Colorado" that we pass along to you (see page 30). Then stretch your mind with features on cutting-edge research into nanorings (see page 22), being conducted by Physics and Mechanical Engineering Professor Mark Lusk; and femtosecond lasers (see page 28), being conducted by Physics Professor Jeff Squier, in collaboration with CSU and CU.

In addition to our features, we think you will enjoy the departments dedicated to general news about Mines, the latest on Mines' research efforts, recently published media from the Mines community, athletics, philanthropy and, occasionally, we will feature something of historical interest. "The Network" is the spot for news of alumni gatherings and general notices of events and services. As part of that section, please see the new career column written by **Dick Hewitt** '82, MSc '89 & '92, PhD '92. Then flip to the most popular section of any alumni magazine, the class notes section, which we are calling "Fast Forward." Thank you; you answered our call when we asked for newsy snippets and photos for this section. Keep them coming! E-mail [magazine@mines.edu](mailto:magazine@mines.edu) or go to our online form at [https://www.oia.mines.edu/forms/fast\\_forward/fast\\_forward.htm](https://www.oia.mines.edu/forms/fast_forward/fast_forward.htm). Each magazine will be capped off by an alumni essay we're calling "The Last Word." In this issue **Andy Schissler** '76 ponders what it takes "Going from Point A to Point B." If you would like to submit your own thoughts for the spring issue of *Mines*, we heartily invite you to do so.

We hope you enjoy!

Anita M. Pariseau  
Executive Director, CSMMA, and Interim Editor

P.S. I am thrilled to announce that Nick Sutcliffe joined us as the new editor of *Mines* and director of communications for the Alumni Association as of February 20. And I'd like to express my appreciation to Nick for his invaluable help in putting the finishing touches on this magazine.

# Campus News

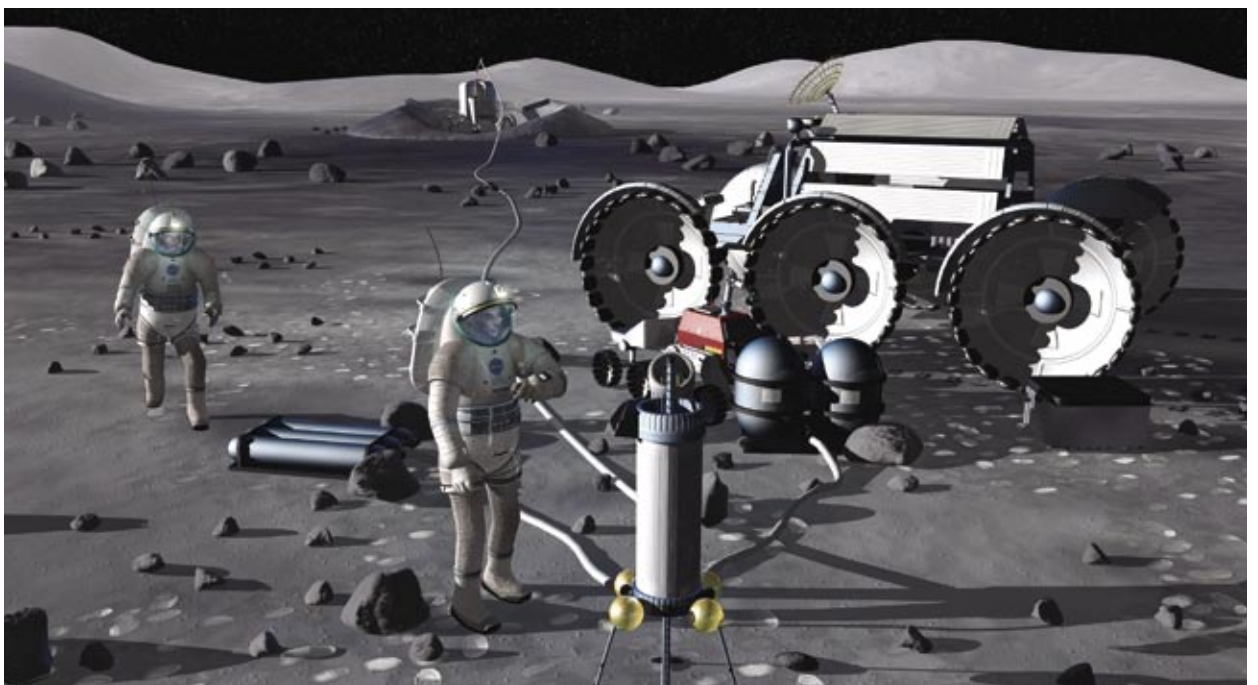
## Roundtable Explores Moon

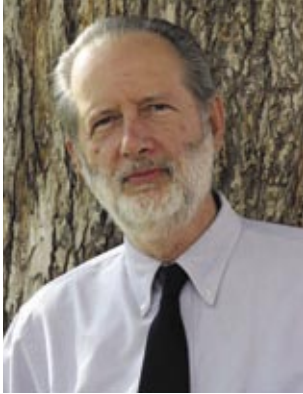
Mines hosted the eighth Space Resources Roundtable, held in collaboration with the Lunar and Planetary Institute in Houston, from Oct. 31 to Nov. 2. The meeting included about 100 participants from the space exploration community, the financial sector, and mining and minerals industries.



Angel Abbud-Madrid, Center for Space Resources director, said the goal of the roundtable was to discuss issues related to the “in-situ resource utilization” (ISRU) of lunar, asteroidal and Martian resources.

The Center unveiled its Eighth Continent Project, which aims to integrate space resources into the global economy through its Commercial Space ISRU Roadmap.





## Award to Mitcham

Carl Mitcham, professor of liberal arts and international studies, has been honored with the 2006 Award for Ethics by the World Technology Network (WTN).

Mitcham, who serves as director of the Hennebach Program in the Humanities, received the honor during the seventh annual World Technology Summit and Awards held in San Francisco in November.

The WTN awards recognize individuals and corporations from 20 technology-related sectors viewed by their peers as being the most innovative and doing the work of the greatest long-term significance.

## 18 Countries Represented at Symposium

Mines, along with the Colorado Energy Research Institute (CERI), hosted the 26th Oil Shale Symposium on campus in October after an 11-year hiatus.

The aim of the three-day symposium, with more than 300 participants representing 29 states and 18 countries, was to review development of oil shale resources worldwide.

Co-chairs Jeremy Boak, of CERI, and Anton Dammer, of the U. S. Department of Energy's Office of Strategic Petroleum Reserves, led technical sessions that presented papers summarizing national programs in the U. S., China, Estonia, Brazil, Morocco and Jordan.

The technical sessions were planned for those active in the development of oil shale resources, including representatives from the energy industry, government, and academic and stakeholder communities. They addressed technology development, resource characterization, national and company programs, environmental and socioeconomic impact, and policy issues.

Some participants also took a two-day field trip to Piceance Creek and Uinta Basins in Colorado and Utah, which introduced an international group to the riches of the Green River Formation. It also forged bonds through the hardships of a snowstorm that closed several passes on the way back to Denver.



## Students See 'Frac Job'

Three Mines Mineral Economics graduate students, Joe Dumesnil, Lindsay Rothfelder and Roberto Aguilera, visited an Encana USA well site in November for a first-hand look at a "frac job"—an oil well stimulation procedure commonly used in the Rocky Mountain region.

At the site, located near Fort Lupton, Colo., the students were introduced to the exciting, complex and sometimes overlooked implications of well-site operations. Dumesnil, who previously worked for the oil field service company Halliburton, arranged the tour.

## CANstruction to Help Others

In November, Mines students collected 6,300 pounds of food during the second annual campus-wide Castle of Cans Food Drive.

The event strives to raise awareness about hunger in Colorado and encourages the donation of nonperishable food for the holidays, while using engineering skills through the friendly competition of CANstruction.

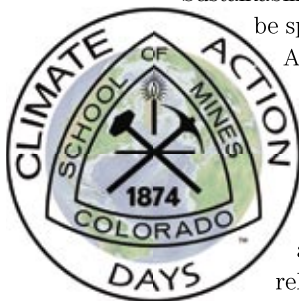
Teams had seven hours to build their can structures from the prepackaged food items collected. Beta Theta Pi members, who collected 1,615 pounds of food, won first place. The most creative structure award went to Phi Gamma Delta for their Sphinx.

Ten percent of the food was divided into Thanksgiving baskets for needy families in Golden and the rest was donated to the Food Bank of the Rockies.



## Event Promotes Awareness of Climate Change

On April 19 and 20, the CSM Sustainability Committee will be sponsoring Climate Action Days. Open to the public, this two-day event will promote awareness of the looming climate crisis and showcase the relevance of Mines' academic programs for



those seeking the knowledge and technical skills to tackle the issue. Attuned to the vast economic opportunities, the Committee has designed the event as a response to both an environmental threat and an economic development opportunity. Speakers will include leading scientists and engineers from Mines, the National Center for Atmospheric Research, the National Oceanic and Atmospheric Administration, the National Renewable Energy Laboratory and the University of Colorado. For more information go to <http://www.climateactiondays.mines.edu/>.



Thomas Cooper, lightboximages.com

## Tributes to Trefnys

President Emeritus John U. Trefny and his wife, Sharon L. Trefny, received honors at Mines' Midyear Convocation in December. John Trefny was awarded an honorary doctorate of engineering for his long career of distinguished service to Mines.

During his 28 years at Mines, Trefny made significant contributions to advancing the School, serving as professor of physics, head of the Physics Department, vice president for academic affairs and dean of faculty, and ultimately as president from 2000 to 2006. Awarding the degree, the Board of Trustees described Trefny as an "exceptional teacher, mentor, scholar and leader."

Mrs. Trefny received a prestigious Mines Medal in recognition of her many years of dedication and exemplary service to the Mines community.



## Mines a Best Buy and Best Value

Mines was selected as a "best buy" in Barron's ninth (2006) edition of its annual *Best Buys in College Education*, and was ranked 46th as an in-state value and 58th as an out-of-state value in *Kiplinger's Personal Finance* magazine's 100 Best Values in Public Colleges.

The Mines profile in the Barron's guide features the school's Engineering Practices Introductory Course Sequence (EPICS), which gives freshmen and sophomores experience solving real-world problems, along with information about the School's student body, academics, facilities and campus life.

Noting the average starting salary of all 2005 graduates was more than \$50,000, and starting salaries for geophysical and petroleum engineers averaged more than \$10,000 higher, Barron's concluded a degree from Mines "bears results."

In compiling Kiplinger's exclusive rankings, the magazine bases its judgment on a combination of "outstanding value with a first-class education."

## Tertzakian First in Lecture Series

Chief energy economist and director of ARC Financial Corp. Peter Tertzakian kicked off the newly established President's Lecture Series in November.

Tertzakian, who began his career as a geophysicist with Chevron and later entered the financial services industry, discussed his book, *A Thousand Barrels a Second*.

Mines President Bill Scoggins said the new lecture series aims to bring to campus highly regarded speakers who specialize in a broad number of topics. Mines will partner with industry, government and the community to feature experts who will be of interest to people both on and off campus.

Scoggins said the second lecture was targeted to coincide with the American Physical Society's annual meeting held in Denver in March.





## Matlock Honored

Longtime Mines professor David K. Matlock has been awarded the prestigious Board of Trustees Outstanding Faculty Award.

The award is designed to recognize the special contributions of a faculty member who has been at Mines for a minimum of three years and made a significant positive impact on student learning with special emphasis on teaching outside the classroom. It is not intended to be given each year and consists of a plaque, a check for \$1,000 and travel support to a national engineering conference for \$1,000.

Past recipients of the award are Robert Baldwin, emeritus professor of chemical engineering, in 2001; Nigel Middleton, vice president of academic affairs, in 2000; and Samuel Romberger, professor of geology and geological engineering, in 1998.

Matlock, ARMCO Foundation Fogarty Professor of Metallurgical Engineering and director of the Advanced Steel Processing and Products Research Center, joined the Mines faculty in 1972 as a member of the physical and mechanical metallurgy program.



member who has been at Mines for a minimum of three years and made a significant positive impact on student learning with special emphasis



## Sulzbach Selected

**Candace Sulzbach** '81, lecturer in the Division of Engineering, was honored by her peers as this year's Faculty Senate Distinguished Lecturer. Her January lecture, "Enhancing Engineering Education through the Concrete Canoe Competition," discussed the advantages of practical hands-on experience for engineering students.

Sulzbach has served as the faculty adviser for the student chapter of the American Society of Civil Engineers (ASCE) for 13 years. Under her guidance, the Mines ASCE chapter hosted the 2000 National Concrete Canoe Competition and has participated in the competition since 1995.

The Faculty Senate Distinguished Lecturer Award was established in 1990 as a means for the Mines faculty to annually honor one of their outstanding colleagues.

## Scoggins Chairs Energy Coalition

Mines President Bill Scoggins has been announced as the co-chairman of the newly launched Colorado Energy Coalition (CEC) under the auspices of the Metro Denver Economic Development Corporation.

CEC, a consortium of leaders and stakeholders in the state's diverse energy industry, aims to make Colorado an even more competitive place for energy-related sectors to conduct business.

One of CEC's goals is to position the region as the "Balanced Energy Capital of the West" — a dynamic energy economy with vast fossil fuel resources, and cutting-edge renewables, alternatives and conservation.



Thomas Cooper, lightboximages.com

## Walking for Cure

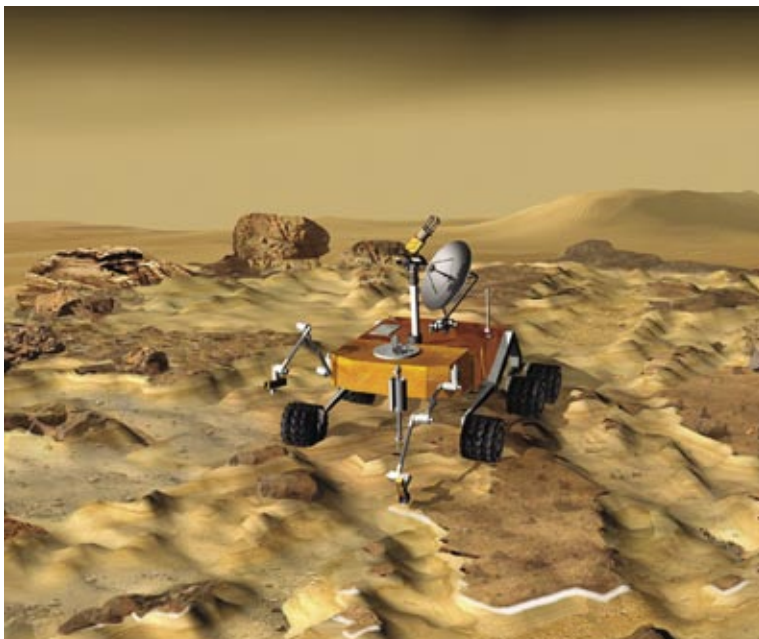
Mines petroleum engineering students, faculty and staff raised more than \$1,000 for breast cancer research in October.

Participants from the Mines' chapters of the Society of Petroleum Engineers, the American Association of Drilling Engineers and Pi

Epsilon Tau, along with faculty and staff, supported the Susan B. Komen Race for the Cure 5K walk/run in downtown Denver.

Petroleum Engineering faculty members  
**Ramona Graves** PhD '82 and **Jennifer Miskimins** MSc '00, PhD '02





## Automated Rock Thin Section Device for Space Exploration

Under the auspices of the Center for Space Resources, Christopher Dreyer, research professor in the Division of Engineering, has received \$250,000 from NASA for the first phase of a three-year \$750,000 project. The project will develop proof-of-concept designs for an apparatus capable of producing thin sections of rocks autonomously. This will allow sophisticated, microscopic analysis of rock properties and mineralogical content of rock samples on other planets.

## New Technology Transfer Advisory Board

Last December the Office of Research and Technology Transfer held its first meeting of a newly formed advisory board. Selected based on the strength of their experience in related fields, the 13-person board is chaired by John Poate, VP of research and technology transfer at Mines, and vice chaired by Gary Held, president, CTEK. The group also includes Michelle Claymore, vice president, Jefferson Economic Council; Jerry Donahue, vice chairman, University License Equity Holdings; **Bruce Kugler** '81, patent attorney, Sheridan Ross; Patrick MacCarthy, CSM chemistry professor; Mike Maloney, director, technology commercialization, CH2M Hill; Merc Mercure, co-founder, Ball Aerospace and CDM Optics; David Wagner, president, David Wagner & Associates, and vice chair, CSM Board of Trustees; Chip Parfet, CEO, George W. Parfet Estate, Inc.; Jack Coppola, senior vice president, Johns Manville; Fred Fraikor, director of technology transfer, CSM; Phil Romig, assistant VP for research, CSM.

The board is charged with extending research on campus to benefit the public and encourage innovation and entrepreneurship through active technology transfer. It will

establish appropriate and efficient infrastructure for the Office of Technology Transfer at Mines, update the School's intellectual property policy, provide guidance on campus start-ups and make recommendations to John Poate.

Before 2004 Mines had only 32 patents after 139 years of working closely with industry. This was because most of the traditional applied research was sponsored by companies interested in solving a particular problem or discovering additional technology for private use. From such arrangements, the resulting intellectual property and/or proprietary technology generally belonged to the sponsoring company.

Today about half the research at the School is federally funded. As a result of federal legislation passed in the 1980s, all intellectual property resulting from federally funded research belongs to the university. This gave rise to the need to better handle the creative inventions of faculty and graduate students by building an inventory of patents for commercialization and licensing.

Perhaps fueled by the federal legislation, a spirit of entrepreneurship has grown at the School, with faculty

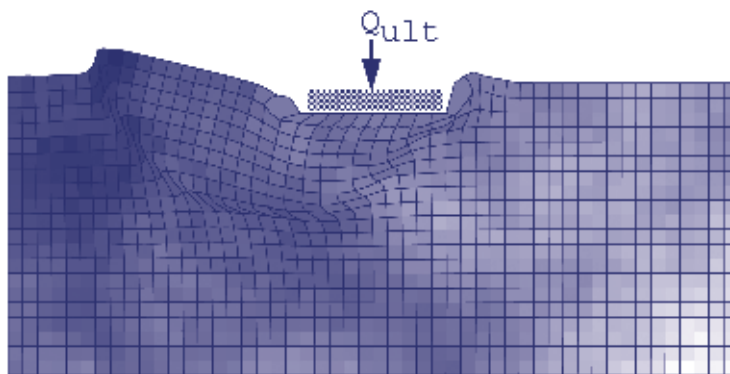
getting involved in start-up companies based on new technologies and inventions developed on campus. License agreements between an embryonic company and the university became an important factor in assisting the start-up's growth and success. Colorado and local communities realized the potential positive impact of university spin-off companies and that technology-based companies tend to cluster around the best universities.

Subsequently the Board of Trustees included technology transfer and economic development as one of the missions in the CSM Strategic Plan. In 2004 Phil Romig, Fred Fraikor and Anne Walker, CSM's general counsel, formulated a plan to catalyze and stimulate inventions and patent applications from research at Mines. Since the university did not have a patent attorney, a competitive search resulted in four patent firms that could handle the wide range of disciplines and technologies at the School. Improved application and disclosure procedures were implemented and licensing agreements were drafted to promote the transfer of applied research into intellectual property protection for faculty researchers and the School.

As a result, the university now has 50 patent applications from research on campus, ranging from biotechnology to unique materials. One start-up company, MicroPhage, has successfully obtained funding from private investors and moved off campus. Based on technology researched by chemistry professor, Kent Voorhees, MicroPhage is focused on improving health worldwide through improved and rapid detection of infectious bacteria such as *staphylococcus*. MicroPhage has an exclusive, worldwide license from CSM.

Two additional ventures have recently been spawned. Metafluidics is based on technology developed by Dave Marr and John Oakey of the Chemical Engineering Department. The company is developing microfluidic/optical integration for a sophisticated biomedical diagnostic "lab-on-a-chip" device capable of cell sorting. Mark Lusk, Division of Engineering, research into nanocarbon fibers is the basis for the start-up company, NanoThread Inc. (See related story page 22.)

While the School has significant accomplishments in the area of technology transfer, much remains to be done. And thanks to the unique skills and extensive experience of the Office of Research and Technology Transfer's new advisory board, the potential for making rapid progress in this strategically critical area is great.



## Probabilistic Studies of Oil Shale Geomechanics

Shell International Exploration and Production Company is funding a two-year research program with Vaughan Griffiths of the Division of Engineering to develop a probabilistic modeling methodology for accessing the uncertainties in geomechanical behavior of oil shale deformation. The probabilistic approach will help provide a better risk assessment of rock formation integrity, which is an essential part of the decision-making process in the development of oil shale reserves.

The geomechanics project will use numerical models similar to this analysis of the bearing capacity of a foundation on spatially random soils. Dark zones indicate weaker soils.

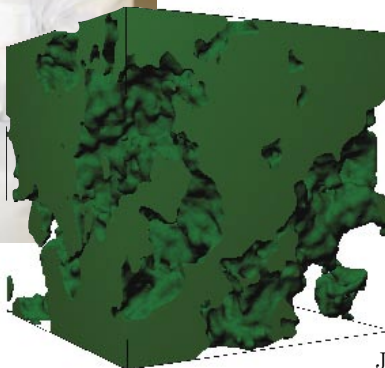
## Research in Geometallurgy

Karin Hoal, research assistant professor of geology and geological engineering, has received \$240,000 from Rio Tinto, Ltd. in Melbourne, Australia, for a PhD student to develop a value model for metallic ores at the Bingham Canyon deposit, Utah. The model will be based on geologic and economic analyses of factors such as materials characterization, deleterious elements, and textural- and alteration-related processing factors. This project is part of a program to improve the ability of mining companies to judge the value of ore at early stages of development.

## Reducing Uncertainty in Interpretation of Subsurface Geology through Application of 3-D Outcrop Models

An additional grant of \$250,000 from Chevron Texaco Energy Technology Company to the Chevron Texaco Center of Research Excellence will enable David Pyles and his colleagues, Mary Carr, Douglas Paton and Charlie Rourke of the Geology and Geological Engineering Department, to apply state-of-the-art 3-D modeling to traditional field geology observations. The combination will improve the resolution and accuracy of subsurface geological and geophysical models, which will, in turn, enable companies to make better predictions of reservoir characteristics and improve their planning for reservoir stimulation.

Graduate student Jim Horan (below) loading a membrane into a conductivity cell. Graduate student Ron Stanis (right) testing a fuel cell, and a 3-D rendering of a PFSA polymer (below).



## Mines to Serve as 3M Subcontractor

Mines has been awarded \$960,000 over four years from the 3M Corporation, in the form of a research subcontract deriving from 3M's contract with the Department of Energy's Office of Energy Efficiency and Renewable Energy. The research at Mines will investigate inorganic/polymer membranes for proton exchange membrane (PEM) fuel cells. The goals of the research are to develop PEM cells that can operate under hotter and drier conditions compared to current technology, and to improve the durability of the membranes. Professor Andrew Herring, who is principal investigator for the project, has previously shown that inorganic additives to the polymeric membrane can achieve both goals, but with the problem that the additives are water soluble. Much of the research will therefore focus on creating additives that have the same properties as those in Herring's previous work but are insoluble. The overall project combines the disciplinary expertise of chemists, polymer scientists, chemical engineers and theoreticians at 3M, Colorado School of Mines, Case Western Reserve University, University of Detroit Mercy and the University of Alabama.

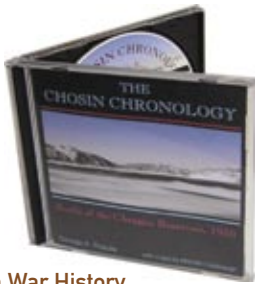
## Middleton and Poate Visit the Petroleum Institute

Executive Vice President of Academic Affairs Nigel Middleton and Vice President of Research and Technology Transfer

John Poate visited Abu Dhabi in November to solidify research collaborations with the Petroleum Institute. Research will be carried out in the areas of reservoir characterization and pipeline corrosion.

## Mines in Collaboration with NREL on Chilean Feasibility Study

Dag Nummedal, director of the Colorado Energy Research Institute, visited Santiago at the invitation and sponsorship of the Catholic University and the COPEC Foundation. COPEC is Chile's largest corporation. Chile is faced with a unique energy crisis, triggered by Argentina's abrogation of a long-term contract for natural gas delivery to generate power for the electricity grid in Chile's Norte Grande—an important district for their mining industry. In response to this, energy discussions in Chile's government and academic circles are exploring long-term solutions that could help Chile's energy grid evolve to meet 100 percent of domestic demand with low-cost, emission-free electricity. Chile's geography has endowed the country with abundant hydro, solar, wind and geothermal energy resources. The Chileans are inviting the Colorado School of Mines, in collaboration with NREL, to help perform a feasibility study for such a new, renewable national energy system.



### Korean War History

**Melville J. Coolbaugh '54** co-authored the e-book *The Chosin Chronology* with Colonel George A. Rasula (retired). The battle of the Chosin Reservoir, also known by its Korean name, "Changjin," pitted U.S. Marines and Army units in a death struggle with vast numbers of Chinese forces in the bitter cold of winter 1950. The CD provides an orderly, chronological accounting of what took place at the Battle of Changjin Reservoir. While Coolbaugh provided map expertise, Rasula assembled an immense amount of information and distilled it down to a concise and accessible 232 pages. See [www.changjin1950.com/](http://www.changjin1950.com/) for more information.

### Second Chance

**John Turley '65** writes: "As a 1965 PE graduate, I spent my career in drilling, production and engineering services, and retired in 2001 as VP of engineering

and technology for Marathon Oil Company. Since that time, I've climbed a new learning curve...writing book-length fiction. Though I've spent considerable time on a mystery/technothriller series that takes place on a Gulf of Mexico drilling rig (pro-

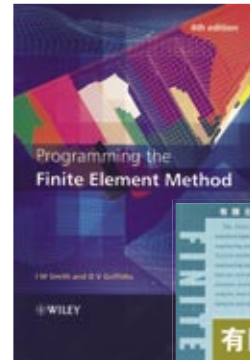
tagonist is a CSM professor who works summers as a drilling consultant), I also write short stories. One such short story,

"History's Humble Heroes," won first place in the NASA-based Bay Area Writer's League (BAWL) 2006 short-story contest. The story was included in BAWL's new anthology entitled *That Thing You Do, Too*, published in December 2006." Turley continues, "The following is a note of possible hope for aspiring engineers. When I applied to Mines in 1960, I did so poorly on the verbal and so well on the math parts of my SATs that I got a letter from the Mines admissions department that asked, 'How could anybody that dumb in English even read the math problems?' CSM made me take the SAT a second time... for which I crammed. My good life continues to happen, now focused extensively on writing, thanks to Mines giving me a second chance."

### Documenting Methodologies

The last 12 months have been a busy time for publication of textbooks written by Dr. Vaughan Griffiths, civil engineering professor.

In March 2006, *Programming the Finite Element Method* by I.M. Smith and D.V. Griffiths, 4<sup>th</sup> ed. Wiley (2004) was reprinted following strong sales of the first print run. The book has also been published in Chinese (see photo) and there are plans for a Spanish version. The text blends theory with computer programs that can be downloaded from the Web and is recommended reading for the course Finite Element Methods for Engineers. The



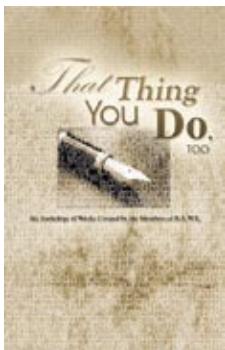
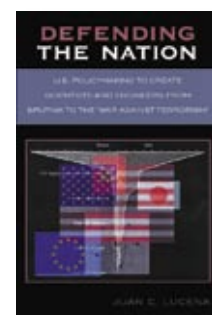
book is also used in an annual short course taught by Griffiths at CSM under the auspices of the Office of Special Programs and Continuing Education (SPACE) called Finite Elements in Geotechnical Engineering.

August 2006 saw the publication of *Numerical Methods for Engineers* by D.V. Griffiths and I.M. Smith, 2<sup>nd</sup> ed., CRC Press (2006). This book has been adopted as the course text in several engineering programs, both in the U.S. and overseas. The text follows a similar philosophy to the finite element book by combining programs (in Fortran 95) with theory and engineering examples. The text is required reading for the course, Numerical Methods for Engineers. Both of Griffiths's books have been coauthored with Professor Ian Smith, a former colleague from the University of Manchester, U.K.

### Lucena Receives Outstanding Book Award

*Defending the Nation: U.S. Policymaking to Create Scientists and Engineers* by Dr. Juan C. Lucena, associate professor of liberal arts and international studies, was awarded the honor of Outstanding Academic Title by CHOICE, the official publication of the Association of College and Research Libraries.

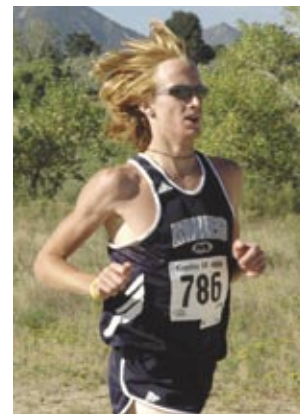
From 25,000 submissions, CHOICE chooses 7,000 titles for review. Lucena's book was one of only 600 selected as "outstanding" in various categories and subjects.



# Cross Country

The Colorado School of Mines men's cross country team placed seventh in the nation at the NCAA Division II Cross Country Championships in November. This came on the heels of the Orediggers placing sixth a season ago. Leading the way for CSM was the trio of seniors Joel Hamilton, Greg Reindl and junior Clifton Oertli, who all earned All-American honors by placing in the top 35 at the national championships. Reindl led the way for the Orediggers as his time of 29:47.3 for the 10,000 meter course was good enough for a 12th place finish. Hamilton was placed 21st with a time of 30:05.2, while Oertli finished in 32nd place as the final CSM runner to earn All-American honors with a time of 30:26.1. Larry McDaris finished 56th while Sean Cusick rounded out the top 5 for CSM as he placed 130th. Hamilton, Reindl and McDaris also earned All-RMAC and All-North Central Region honors.

The Orediggers placed third at both the RMAC and Regional Championships behind Adams State and Western State. Adams State finished second at the national championships, while Western State was third. All RMAC honors are awarded to the top 10 finishers in the race, while All-Region accolades go to the top 15 finishers in the race. The CSM women's team, which placed 14th in the nation three years ago and fifth in Division II in 2005, featured a young squad with seven of its top runners being either freshmen or sophomores. Senior Serena Gardiner led the team by placing 16th at the RMAC Championships and 47th at the NCAA II North Central Regional Championships. Her performances helped CSM finish eighth at the RMAC Championships and 12th at the North Central Regional Championships.



Joel Hamilton, Cross country



Larry McDaris, Cross country

## Football

A youthful Colorado School of Mines football team finished the 2006 season with a 4-7 overall record, including a 2-6 mark in the RMAC.

The Orediggers had 14 starters who were either sophomores, redshirt freshmen or true freshmen, including eight on the defensive side of the ball.

Senior running back Bryan Florendo led the offense as he tallied 1,455 yards from scrimmage, including 1,018 rushing yards. He was a First Team All-RMAC, First Team Academic All-District and Second Team Academic All-America selection.

Junior wide receiver/kick returner Michael Curl also enjoyed an outstanding season. He was a First Team All-RMAC selection at both positions, as well as a First Team All-Region pick. He finished the season with 41 catches for 516 yards and two touchdowns, led the RMAC in kick return average (31.4 ypr) and posted two kick return touchdowns.

In addition, senior center Nick Belden was named to the All-RMAC First Team for the first time in his career. It was also the fourth straight season he was selected to the All-RMAC team.

Earning Second Team All-RMAC accolades were junior tight end Derek Dykstra, junior defensive lineman Marin Richardson and senior linebacker Danny Sprague.

Senior defensive lineman Charles Yarbrough, redshirt freshman offensive lineman Zach Meints, redshirt freshman linebacker Hunter Wardlaw and true freshman linebacker Isaiah Smart were all named to the Honorable Mention All-RMAC Team.

## Volleyball

The Colorado School of Mines volleyball team concluded the 2006 season with an overall record of 11-17, including a 7-12 mark in the RMAC.

The highlight of the season came on

Sept. 23 when the Orediggers picked up a 3-2 win at perennial power and defending Division II national runner-up, Nebraska-Kearney. It was the first time CSM knocked off UNK in program history.

Senior middle hitter Amanda Rebol led the squad this year as she capped her outstanding career as one of the most decorated players in CSM history.

Rebol earned First Team All-RMAC honors for the second straight season and All-RMAC accolades for the third straight year. She finished the season with team-highs in kills (318), hitting percentage (.240) and blocks (159) and was also second in digs (326). Her 159 blocks were a school record for blocks in a season, breaking her own mark of 152 set last season.

In addition, Rebol concluded her career at CSM as the all-time leader in blocks (525) and block assists (415). She is also fifth in career attacks (2,774), fourth in career kills (1,025) and second in career blocks per game (1.50).



Mikayla Buenger, Soccer

Junior middle hitter Nicole Leeper was named to the All-RMAC Second Team after producing 262 kills, a .197 hitting percentage and 82 digs, while freshman right side Kaity Edmiston earned honorable mention All-RMAC honors.

Edmiston, the Preseason RMAC Freshman of the Year, finished her first season with 227 kills, 175 digs, nine service aces and a .146 hitting percentage.

For the seventh straight season, the Colorado School of Mines men's soccer team earned a berth in the Rocky Mountain Athletic Conference postseason tournament.

The team completed the regular season with a 13-6-1 overall record, including 9-3 in the conference. Head Coach Frank Kohlenstein was named the Co-RMAC Coach of the Year for his efforts.

CSM was knocked out in the semifinals by Metro State, 3-2, in double overtime. It marked the third consecutive time that the two teams had met in the semifinals with Metro State winning in 2004 and 2006 and CSM winning in 2005.

Junior forward Craig Thompson was named to the All-RMAC First Team and All-Region Second Team after leading the team in scoring.

Senior midfielder Travis Hutchinson was

Craig Thompson, Soccer

also a First Team All-RMAC and Second Team All-Region honoree, while senior goalkeeper Kevin Galloway was a First Team All-RMAC honoree.

Senior defender Brian Law, sophomore midfielder Masaki Hemmi and junior defender Nick Kubala were named to the All-RMAC Second Team.

## Soccer

In just its second season of competition and its first in the Rocky Mountain Athletic Conference, the Colorado School of Mines women's soccer team just missed out on the final berth in the RMAC Postseason Tournament.

Heading into the final day of competition, CSM had a chance to qualify for the tournament, but dropped a 3-0 decision to New Mexico Highlands. The loss left CSM in seventh place in the RMAC. The top six schools qualified for the tournament.

Freshman Kayla Mitchell and sophomore Mikayla Buenger were each named to the All-RMAC Second Team for their play on the field. Mitchell led the team with 11 goals and 25 points. Buenger had five goals and 13 points.

## Overtime


**Men's Basketball:** The Oredigger men's basketball team is currently 5-3 overall and 2-1 in conference play. CSM opened the season with a pair of wins at its own tournament on Nov. 17-18. In a 70-60 win over New Mexico Highlands on Dec. 15, sophomore Kyle Pape scored a career-high 36 points en route to RMAC Player of the Week honors. He currently leads the team with 14.6 points per game, while senior Franklin Ryk posts 13.5 points per night.

**Women's Basketball:** CSM stands at 3-6 overall and 2-1 in the RMAC. After a difficult schedule to open the season left CSM at 0-6, the Orediggers rattled off three straight wins and were in third place in the conference. Senior Iva Tomova leads the team in scoring at 14.3 points per game, while freshman Emily Dalton is averaging 10.1 points and 4.8 rebounds per game.

**Wrestling:** The CSM wrestling team has tallied a 2-3 overall record to start the season. The squad opened the season by placing fourth in the 2nd Annual CSM/Jack Hancock Duals Open in Steinhauer Fieldhouse. The event, which was won by Division I Oregon State, featured 13 teams from 11 different states. Freshman 125-pounder Geoff Meng leads the team with a 12-2 record and six falls. The team was in eighth place after hosting the NCAA II/RMAC West Regional Championships on Feb. 25.

**Swimming & Diving:** The Oredigger swimming and diving teams have gotten off to fast starts in the 2006-07 season. The men's team placed second of nine teams at the prestigious Nebraska-Omaha Invitational, while the women's squad was fifth of 10 teams at the same event. Several swimmers are also ranked in the top 3 of the North Central Conference rankings in individual events.

**Indoor Track & Field:** The men's and women's team opened the season on Jan. 20 when they hosted the Joe Davies Open in Steinhauer Fieldhouse. After the RMAC Championships on Feb. 23-24, both men's and women's teams finished fifth in the division.



## Investing in Mines

An investment in knowledge always pays the best interest.

—Benjamin Franklin

# \$155 million: Building the Foundation for Mines' Future

en·dow·ment –  
noun – the capital  
that provides income  
for an institution

Totaling \$155 million\*, the Colorado School of Mines endowment helps to ensure that the School's leadership will carry on for generations to come. By providing continued support for Mines' distinctive educational experience, the hundreds of separate endowed funds that make up the Mines endowment are vital to the School's long-term strategy for continued innovation in engineering and applied science.

A growing endowment gives Mines greater financial independence and flexibility to plan for the future in the face of budget fluctuations and limited state support. Because endowed funds provide the School with such tremendous leverage, the Colorado School of Mines Strategic Plan calls for increasing the endowment to at least \$300 million over the next several years as part of an overall strategy to expand the School's financial resource base.

Similar to the way in which principal from an individual's nest egg will produce interest to sustain

them through retirement, Mines' endowment principal generates interest that provides ongoing support for initiatives that are critical to the School's future. For example, endowed scholarships enable talented, highly qualified students to earn a Mines education, regardless of their financial status. Endowed chairs and professorships help the School to attract world-renowned faculty and support their innovative teaching and pioneering research. And endowments for other integral parts of Mines' academic community, such as the McBride Honors Program and Arthur Lakes Library, support a campus-wide culture of intellectual vitality for its students and faculty.

In 1983, the Mines endowment totaled approximately \$8 million. Since then, it has increased an average of over 14 percent annually through investment returns and additional gifts from the School's loyal community of donors. The Colorado School of Mines Foundation, which manages the endow-

### Mines' Endowment by the Numbers

- Among all public colleges and universities in the U.S., Mines currently ranks **15th** in endowment dollars per student, according to data released by the National Association of College and University Business Offices (NACUBO).
- Mines' endowment investments have averaged an annual return of **11.9** percent over the last **15** years.
- Of Mines' **368** separate endowed funds, **249** are designated for student assistance, **35** for faculty support, **74** for academic programs and **10** for other uses.
- During the **2005-06** academic year, endowed scholarship funds provided approximately **\$1.8 million** in assistance for Mines students.
- A total of **24** endowed chairs and professorships help Mines to recruit and retain outstanding faculty.
- In fiscal year **2006**, the Colorado School of Mines Foundation provided nearly **\$4.5 million** from the endowment balance to support students, faculty and programs at Mines.

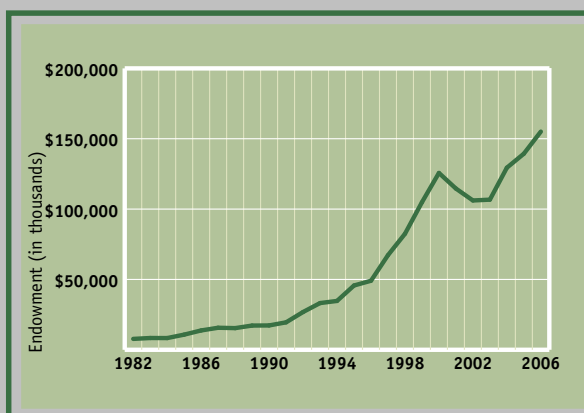


ment, releases a fixed percentage of the principal each year and reinvests additional investment income along with the original principal. As a result, the initial endowment gift holds its value against inflation, while providing support for the people and programs that sustain Mines' tradition of excellence.

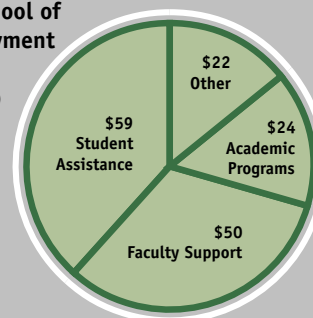
Just how much benefit can a single endowed fund bring to Mines? Take, for example, an endowed scholarship fund established in 1987 with an initial investment of \$100,000. By the end of the 2006 academic year, the fund would have provided about \$170,000 in tuition support for Mines students. Meanwhile, the principal would have grown nearly three-fold, to \$280,000. As an endowed fund's principal grows, so does its capacity for generating interest. The generous donor who creates an endowed fund can take pride in providing Mines with a self-renewing resource that generates annual support and helps to build wealth for the School long into the future.

For additional information about the Colorado School of Mines endowment or to make a gift, contact the Office of Institutional Advancement at (303) 273-3275.

**Growth of Colorado School of Mines Endowment 1982-2006**



**Colorado School of Mines Endowment Allocation (in millions)**



## Mines Acknowledges Individual, Corporate and Foundation Donations

**Recent individual gifts of \$25,000 or more to Colorado School of Mines include:**

**Lonnie L. Abernethy** added \$50,000 to endowed fellowship funds in ceramics, honoring his parents and his late son.

**Steve '64 and Dollie Chesebro'** made gifts totaling \$110,000 to the Darden Baseball Field Fund and the John U. and Sharon L. Trefny Endowment for Curriculum Advancement.

**Jim Classen '57** made a gift of \$51,722 to the Geology Department in honor of his 50th reunion.

**Joe Coors, Jr. '91** gave \$25,000 to support athletics.

**Marshall '67 and Jane Crouch** gave a total of \$60,000 to Mines, including discretionary funding for professors in the geology and geophysics fields, support for athletics and the first payment of their \$250,000 pledge to Marquez Hall.

**Norm '48 and Shirley Domenico** donated \$50,000 to establish the Domenico Endowed Scholarship Fund.

**Gerald '68 and Tina Grandey** made an endowment gift of \$100,000 to support the Robert and Ruth Weimer Fund for Sedimentary Geology, curriculum development and the McBride Honors program.

**John and Lois Haun** established a charitable gift annuity with a gift of \$100,000.

**Ralph L. Hennebach '41** continued his support of the Hennebach Visiting Professorship program with a \$109,620 gift.

**Bob Irelan '68** donated \$25,000 toward a total commitment of \$100,000 to the Darden Baseball Field project.

**Al Ireson '48** contributed \$40,000 and a matching gift to the Ireson Family Endowed Scholarship and \$5,000 to The Mines Fund.

**Francis '52 and Mary Labriola** gave \$25,000 in crucial unrestricted funding to The Mines Fund.

**John '52 and Erika Lockridge** gave \$50,000 to support the John U. and Sharon L. Trefny Endowment for Curriculum Advancement.

**Carolyn V. Mann** continued her support of the John and Carol Mann Graduate Fellowship in Geology Fund with a \$50,000 gift.

A bequest of \$46,790 from the estate of **Harold Mendenhall '38** will establish a student prize in geophysics.

**F.H. Merelli '59** made a \$70,000 gift to support the Petroleum Engineering Department.

**Tom Snedeker '36** established a charitable gift annuity with a cash gift of \$60,000.

**Katherine Stuart**, widow of **Herbert Stuart '36**, established a charitable gift annuity with a contribution of \$147,336 in appreciated securities.

**J. Don Thorson '55** continued his support of the Wyoming Scholarship Fund with a \$100,000 gift.

**Alice M. Tolen** made a \$75,000 gift in memory of her husband, **Delbert F. Tolen '57**, to establish an endowed scholarship fund.

**Jim Weber '71** added \$55,000 to an endowed fellowship fund in geology in memory of his parents.

## Budding Scholars Receive Prestigious ARCS Awards



Ask Lisa Herickhoff about her memories of receiving a scholarship award from Achievement Rewards for College Scientists Foundation, Inc. (ARCS) and she'll tell you about her "ARCS tree."

The lush curly willow tree now occupying her parents' yard had its beginnings as decorative filler in a table centerpiece Lisa won at the annual ARCS scholar recognition event. Busy with her graduate work in biology, Lisa had let the floral arrangement wither in its vase. She gave it to her mother to salvage, and soon a sapling was sprouting from the previously forlorn-looking twig. The tree, like ARCS, has been "giving and giving" ever since, according to Lisa, who has grown some trees of her own from its cuttings.

Today, as a successful business owner and consultant, Lisa gives back to ARCS by serving as a co-president of the Denver chapter, sharing presidential responsibilities with Lyda Ludeman and carrying on the tradition of giving that ARCS has sustained for half a century.

Budding young scientists like Lisa often need financial support to focus on their studies and prepare themselves for work in high-demand fields. That's where ARCS steps in. Founded in 1958, the one-of-a-kind, all-volunteer women's organization

ARCS co-presidents Lisa Herickhoff and Lyda Ludeman with past president Nancy Kerr (from left to right).

### Mines Acknowledges Individual, Corporate and Foundation Donations (cont.)

**Recent corporate and foundation gifts of \$25,000 or more to Mines include:**

The **Adolph Coors Foundation** contributed a total of \$785,500 to support the Student Recreation Center, the William K. Coors Distinguished Chair in Chemical Engineering, and the Herman F. Coors Professorial Chair in Ceramics.

**Apache Corporation** contributed \$33,904 to support graduate student research at Mines.

The **ARCS (Achievement Rewards for College Scientists) Foundation** contributed \$43,000 toward scholarships for eight students.

**BP** contributed gifts totaling \$27,000 to support scholarships, fellowships, the student AAPG chapter, and an educational field trip.

**Chevron** contributed \$140,000 to support several departments, programs, student organizations, and scholarships.

**CoorsTek** donated a Cirrus Residual Gas Analyzer valued at approximately \$45,452 to further the School's efforts in fuel cell research.

**Cytec Industries** contributed \$30,000 to support the research efforts of Professor Kim Williams.

**Hess Corporation** contributed a total of \$55,000 to support the Petroleum Engineering Department and a graduate fellowship in the Geophysics Department.

**Infiltrator Systems, Inc.** continued its support of the research and educational activities of Dr. Robert L. Siegrist in the area of on-site and alternate wastewater technologies with recent gifts totaling \$50,400.

The **Li Foundation** contributed \$42,000 for the Li Foundation Fellowships.

The **Marathon Oil Company Foundation** contributed gifts totaling \$122,000 toward the Marathon Center of Excellence for Reservoir Studies and to support the departments of Geology and Geological Engineering, Geophysics, and Petroleum Engineering.

**Peabody Energy** gave \$25,000 to the Mining Engineering Department.

The **Phelps Dodge Foundation** contributed \$40,000 toward the George R. Munroe-Phelps Dodge Foundation Scholarship program.

**Schlumberger** gave a Faculty for the Future Award of \$40,821 to a graduate student studying materials science.

**Shell Oil Company** contributed \$121,500 for departmental support, the Career Center, the Minority Engineering Program, the McBride Honors Program, Senior Design, and scholarships.

The **Viola Vestal Coulter Foundation** gave gifts totaling \$35,000 to support the Coulter Chair in Mineral Economics.



Lacy Ledbeter in the lab

fosters scientific and technological advancement by awarding scholarships to high-achieving science, medicine and engineering students. Over 11,000 students have benefited from more than \$57 million raised collectively by 14 ARCS chapters across the United States.

At this year's ARCS Scholar Recognition Luncheon, hosted by Mines in November, ARCS Denver awarded \$178,000 in scholarships to 35 exemplary Colorado students from Colorado School of Mines, Colorado State University, the University of Colorado at Boulder, and the University of Colorado at Denver and Health Sciences Center.

For 30 years the Denver chapter of ARCS has been helping Colorado college students succeed by providing both financial support and encouragement. A Mines student was the first to receive a scholarship from ARCS Denver, and the organization has since awarded 528 scholarships, totaling over \$2 million, to promising Colorado students.

The annual ARCS luncheon provides scholarship recipients an opportunity to meet the women of ARCS and make connections with the broader scientific and engineering community. **Forest Bommarito '03**, MSc '05, a former ARCS scholar, appreciated opportunities like this most about the program. "Networking with world-class scientists in a wide variety of different fields, from doctors to engineers to chemists to mathematicians, and hearing inspiring scientists describe their love for what they do—those were the most valuable aspects of my experience," says the Anchorage-based petroleum engineer.

Lacy Ledbeter, a PhD student in geochemistry at Mines and 2006-2007 ARCS scholar, finds her self-confidence boosted by this honor. "The ARCS scholarship program is invaluable for students, as it provides encouragement to the aspiring scientist," she says. Upon graduation, Lacy plans to work on the remediation of contaminated waste sites or the detection of substances associated with chemical and nuclear proliferation. "The ARCS award not only assists me financially, but it also keeps me focused on all I can do professionally to give back to society," she explains.



Forest Bommarito and his wife, Olivia '03, in Alaska

Like Lisa's curly willow tree, ARCS' generous spirit has firmly taken root in Colorado, providing sustenance for the next generation of leaders in science, medicine and engineering. The tradition of giving grows with each budding scholar ARCS supports, as these talented students go on to use their skills and education to make important contributions to the global community.

**For more information about ARCS Denver, visit [www.arcsfoundation.org/denver](http://www.arcsfoundation.org/denver).**

## 2006-2007 Colorado School of Mines ARCS Scholars

**Justin Colby**  
Sr., Petroleum Engineering

**Elio Dean**  
Sr., Petroleum Engineering

**Lacy Ledbeter**  
PhD candidate, Geochemistry

**Rachel Miller**  
Sr., Physics & Math

**Scott O'Connor**  
Sr., Mining Engineering

**Johnny Runyon**  
PhD candidate, Applied Chemistry

**Ryan Veirs**  
Jr., Physics

**Andrew Vermilyea**  
PhD candidate, Geochemistry

After several decades of decline, the state of science and engineering education in the U.S. is reaching critical proportions.

# The Quiet Crisis

By Shirley Jackson



Thomas Cooper, lightboximages.com

**I** have been speaking for some years about the critical need to invest in our national “intellectual security”—to invest in our human talent in science and engineering.

Several trends are converging:

- The aging of today's scientists and engineers, many of whom were inspired, 50 years ago, when the then-Soviet Union launched Sputnik, the first Earth-orbiting satellite. That began what was called the “space race,” which was another term for the “defense race,” which was, in actuality, a “science race.”
- Today, though, there is an insufficient number of young scholars in our nation's science and engineering “pipeline” to replace the generation of scientists and engineers who will retire in the next five to ten years.
- There has been a decline in the number of international scientists and students who come to the United States to work and to study. This is partly because of post 9/11 visa policies, but it is, primarily, because there are fast-growing opportunities abroad for work and for study either keeping them at home, or drawing them elsewhere. This group has long been an important source of skilled talent for the U.S. science and engineering enterprise.


- Concurrently, our national demographics are changing. Young women and ethnic minority youth, now, account for more than half of our population. These groups traditionally have been underrepresented in science, engineering, mathematics and technology. It is from this nontraditional group—this “new majority”—that the next generations of scientists and engineers, also, must come.
- Finally, federal investment in basic research in the physical sciences and engineering has declined by half since 1970, as a percent of Gross Domestic Product (GDP). Since research and education potentiate each other, this has had a deleterious effect on the creation of a new generation of scientists and engineers.

These converging forces comprise what I term the “Quiet Crisis.” It is “quiet” because these are creeping trends—the true impact unfolds only gradually, over time, and is easy to ignore or overlook. It takes decades to educate and to fully prepare a physicist or a nuclear or petroleum engineer.

It is a “crisis” because discoveries, inventions and innovations create whole new industries which keep our economy thriving, and which mitigate the global scourges that make for human suffering and global instability. Without innovation we fail—as a nation and as a world....

I, and others, have spoken publicly of the nation’s urgent and growing need for skilled professionals in science, technology, engineering and mathematics (STEM). These unique individuals—who comprise a mere 5 percent of the workforce—fuel our national capacity for discovery and innovation—innovation which creates industries, improves the quality of life and assures our national competitiveness, our global leadership and our security.

I ask that you assume a leadership position in reaching back and encouraging the next generations to follow your lead, mentoring and guiding those who are younger, and encouraging their curiosity, excitement, and exploration of more mathematics and science. It means speaking out for the STEM professions and helping people to understand that so many of everyday things—from the iPod in your pocket, to your running shoes, to lifesaving medications—rest firmly on discovery and innovation—on science, engineering, mathematics, technology.

Leaders in the corporate world, higher education, finance, the non-profit sector and government agree that, as more nations invest in their own workforces and develop their economies, American competitiveness may be at risk. They concur that we must invest more deeply in our intellectual talent, and draw more young people into science, engineering and mathematics. 



Shirley Jackson was keynote speaker at Midyear Convocation, where she was awarded an honorary degree. While on campus she toured labs and met with members of the Mines community.

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*Shirley Jackson is the president of Rensselaer Polytechnic Institute. Dr. Jackson holds a PhD in theoretical elementary particle physics from MIT (1973) and an SB in physics from MIT (1968). She is the first African-American woman to receive a doctorate from MIT—in any subject. She is one of the first two African-American women to receive a doctorate in physics in the U.S.*

“The research front is moving faster than any one person can keep up with... I have never been involved in a field of research where advances are measured in weeks and months.”

—Mark Lusk, professor of physics and mechanical engineering

By Larry Borowsky

# Nanomania

You’ve probably heard of carbon nanotubes, or CNTs. These cylindrical structures came to researchers’ attention about 15 years ago and have been a hot research subject ever since. Their great tensile strength, thermal conductivity and electrical properties create a broad range of potential applications. Nanotubes have been used in the manufacture of transistors, memory circuits, semiconductors, polymers and other products. The bicycle that Floyd Landis rode in the 2006 Tour de France had a carbon-fiber frame that incorporates nanotubes.

Fuse the ends of a nanotube together and you come up with the object of Mark Lusk’s fascination: a *nanoring*. This hollow, donut-shaped “0” possesses unique mechanical and electromagnetic properties, offers greater flexibility than CNTs—and may be the key to realizing heretofore unattainable applications.

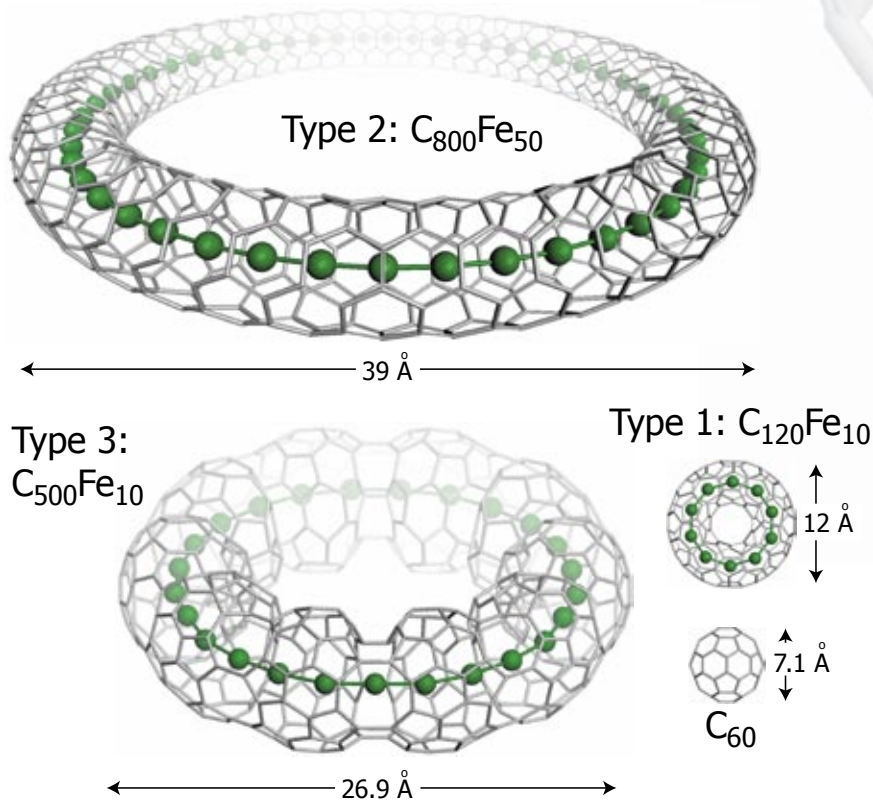
“The research front is moving faster than any one person can keep up with,” says Lusk, a professor of physics and mechanical engineering at the School of Mines. “I have never been involved in a field of research where advances are measured in weeks and months.” Lusk is one of only a handful of researchers nationwide looking closely at nanorings. Their study has been impeded by a simple problem: Nobody has perfected a method for synthesizing nanorings in a controlled setting. However, Lusk believes human-made nanorings will exist in the very near future—one group has recently learned how to make ring-like structures composed

of coalesced carbon spheres, and the synthesis of perfect toroids will follow quickly.

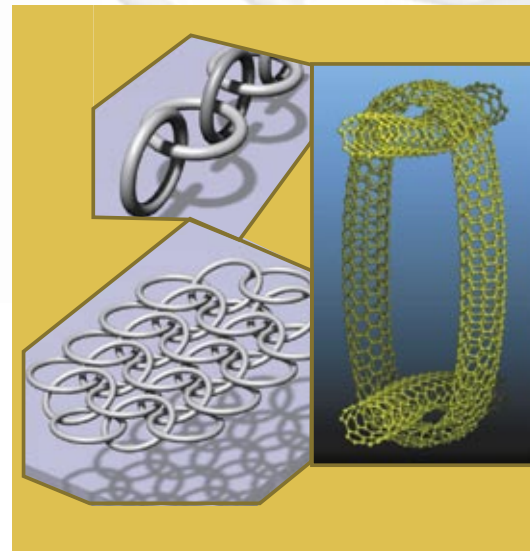
“It is a hotly pursued goal,” says Lusk. “They haven’t done it; not quite yet. But as soon as they do, the hunt is going to be on for applications.”

The first ones to reach full development probably will exploit nanorings’ unique electromagnetic properties. “The development of uses would parallel the myriad applications that society has found for transistor technology,” Lusk says. “You might have a micromagnet, 10 angstroms across—what could you do with that? You might be able to engineer a new sort of levitation technology based on materials embedded with a large number of these toroidal carbon nanotubes. Potential applications even exist in stealth technology; you could paint them into a plane wing to absorb radar waves.”

Although his research now embraces electromagnetics, Lusk’s original work focused on the mechanical strength of



Three types of carbon rings (in gray) encapsulating atomic iron wires (in green). Lower right.  $C_{60}$  Buckyball. All images to scale.



Counter-clockwise from top: nanochain, nanomaile and molecular dynamics simulation of nanochain stretching.

nanorings—and he is the first researcher in the field to explore their mechanical limits.

“For structural design, you have to know the most extreme conditions under which the building material remains stable,” he says. “We need to know how hard you can pull on these rings, and what happens when you let go.”

With laboratory trials unavailable, Lusk has sketched out the strength parameters of nanorings *ab initio* using computer simulations. The simulations are grounded in quantum mechanics and keep track of all of the electrons and nuclei that hold the rings together and underpin their mechanical properties. The results are striking: Nanorings possess extraordinary tensile load capabilities and a huge strength-to-density ratio.

“The bonds are incredible—of nearly diamond strength,” says Lusk. “Nanorings are 20 times stronger than steel and four times stronger than spider silk.”

The mechanical applications for these rings would become even more tantalizing if you could figure out how to interlock them into a nanochain or, chain-link style, into nanomaile. With its almost unequaled combination of strength and flexibility, some form of nanomaile might remove some of the most vexing technological obstacles confronting engineers in science and industry.

One possible application: Nanomaile might form the basis of material for the much discussed “space elevator.” This structure—basically a gigantic tether that would extend from the Earth into outer space—would serve as a transport mech-

anism, providing a route into low-Earth orbit that doesn’t require the use of rocket propulsion. In the quest to design the space elevator, several research consortia (including NASA) have conducted extensive materials research—so far, without success. Nanomaile might represent part of the answer.

“That’s just one of the really exciting possibilities,” says Lusk. “For example, with the right materials, we could build a suspension bridge across the Strait of Gibraltar, linking Europe to Africa. Or here’s another one: ‘suspension skyscrapers.’ The floors would be hung from the top of the structure, rather than supported from underneath. Nanorings could form the basis of materials that make things of this type possible.”

“Those applications are likely many years away from full development,” says Lusk. Then again, once the research momentum picks up, things might fall right into place. “When does the first ice crystal form on a pond?” he asks. “You never know when—but as soon as it does, the whole pond freezes.”

According to the journal *Nature*, this type of technology may already have a longer history than we imagined. A recent study concluded that Damascus swords, the fearsome weapon faced by the Crusaders during the Middle Ages, got their legendary strength and cutting ability from nanotubes, which formed naturally at high heat during the forging process.

So perhaps the distance from chain maile to nanomaile isn’t as great as it seems. [M](#)

*Freelance writer Larry Borowsky has contributed articles to Slate, WSJ.com, Sunset, 5280, and The Denver Post.*

Mines Installs  
M.W. "Bill" Scoggins  
as 16th President

# Scoggins Sets Course

Bill Scoggins was installed as president on December 15, 2006, as part of the Midyear Convocation ceremony. We include highlights of his remarks and those by Dr. Brajendra Mishra, president of the Faculty Senate for 2006-07 and professor of Metallurgical and Materials Engineering; and Alumnus Robert Applegate '03, currently a graduate student in physics.

Photography by Thomas Cooper, [lightboximages.com](http://lightboximages.com)





## Bill Scoggins:

I am deeply honored to have been selected as the 16th president of Colorado School of Mines. I accept the responsibility of this office with humility, but also with firm resolve and commitment to advance the educational, research, and outreach missions of this extraordinary institution....

As the first public institution of higher learning to open its doors in Colorado, we have a rich, 133-year-old history filled with important milestones and unique traditions....

Mines has always been a “focused” institution educating future engineers and scientists. But, that focus has grown from a mining engineering school in the beginning to one today that encompasses multi-disciplinary programs in Earth, Energy, Materials, and Environment, programs rooted in science and technology but which acknowledge their social and human contexts. Our strengths are known worldwide....



Bill and Karen Scoggins.

[Our] strengths, together with the rich heritage and traditions of the institution, provide a firm foundation on which to build for the future and raise our stature as a world-class research and educational institution. In this regard, we are well along on implementation of the ten-year Strategic Plan, developed under the leadership of my predecessor, Emeritus President John Trefny, and launched in 2004. The plan embodies seven fundamental strategies to:

1. Cultivate world-class expertise in our focus areas of Earth, Energy, Materials and Environment;
2. Enhance Mines' distinction as a research institution;
3. Sharpen Mines' distinction in undergraduate education;
4. Align graduate programs with professional and societal needs;
5. Realign the geographic, demographic and programmatic mix of students;

6. Expand the financial resource base; and,
7. Restructure the deployment of financial resources and capital assets.

This plan clearly provides a roadmap to the future; but like most journeys, one is advised to make frequent stops to assess progress and make appropriate midcourse corrections to assure arrival at the desired destination.

We are in the process of such an assessment now. And this has raised some broad questions we must address in order to energize the plan implementation and ensure we're better positioned to move Mines to its next level of prominence and stature. In asking these questions, I am reminded of a quote by James Thurber, who noted, "It is better to know some of the questions than all of the answers." Well, I certainly don't have all the answers, but I do have five critical questions:

First: Do we have broad alignment as an institution around a common vision and our core values and mission? I know I want to build more unity of purpose because it is essential to our future success. We will achieve this through broader communication and participation across the campus.

Second: Have we realistically addressed our growth capacity? I believe we must preserve our long established "education values," such as small classes, faculty availability for mentoring as well as advising, and student-centered research. Clearly, our enrollment growth must be balanced against our infrastructure availability—and we are out of space today with slightly over 4,000 students. As we address this question of growth, we should really be asking: How big do we want to be? To many, our relatively small size is a positive, appealing attribute.

Third: Are we able to embrace and adapt to change? We all know big changes are on the way—whether they're driven by rapid assimilation of new technologies, global economic growth (particularly in the developing world), geopolitical conflicts, environmental change or major natural disasters.

If only we had a crystal ball to know exactly what and when and where we could expect the inevitable drivers of constant change. At Mines we must have an organization structure and, more importantly, a mindset that fosters adaptation of our curricula, teaching methods and research initiatives for the front-end of societal change, ensuring our programs are relevant and progressive, and that our students are appropriately prepared. We need to fully realize the benefits of our extensive multi-disciplinary approach to the School's focus areas.

We also need to adopt new budgeting and financial processes that ensure we're allocating our revenue dollars in alignment with our strategic and multidisciplinary goals, and that our administrative and other services are efficient and become the best practices adopted by our peers.

Fourth: Do we have an appropriate "campus infrastructure vision" that reflects not only our strategic direction, but also our broader role in the future of the Golden community? I'm in favor of rethinking our current campus master plan and the time and footprint required to refurbish existing structures, as well as build new student housing and academic facilities for teaching

“Diversity provides broad appreciation of different cultures and practices, recognizes the changing demographics of tomorrow’s leaders, provides a learning environment for our students more indicative of the world they’ll work in, is key to recruiting and retaining world-class faculty, and facilitates access of underserved students to our campus.”

and research. After years of deferred maintenance necessitated by budget issues, we have an ambitious capital program in front of us just to accommodate our current size.

However, we need to look beyond the current challenges and consider a plan to increase our residential campus focus, develop research parks, and perhaps establish a shared community and conference center.

And into this “campus infrastructure vision,” it is increasingly important that we incorporate a sustainability strategy that will benefit Mines and all our neighbors.

Finally—whether we’re addressing near-term or longer term needs, it is clear we cannot rely on as much state support as we have in the past to move ahead at a responsible pace. But we must be more aggressive and set more challenging goals in our fundraising efforts and, as permitted by our enterprise status, look to jump-start our academic facility program by prudently using our debt-financing capacity.

The fifth and final question is, do we have the commitment across our campus to welcome and engage more diversity within the administration, faculty and student body? I believe we do.

Diversity provides broad appreciation of different cultures and practices, recognizes the changing demographics of tomorrow’s leaders, provides a learning environment for our students more indicative of the world they’ll work in, is key to recruiting and retaining world-class faculty, and facilitates access of underserved students to our campus. Similar to President Hank Brown’s approach at CU, we will establish some firm goals in this regard, along with clear accountability for achieving them.

Questions such as these pose challenges, and challenges usually call for changes. Sydney J. Harris, a Chicago Daily News columnist, once wrote: “Our dilemma is that we hate change and love it at the same time; what we really want is for things to remain the same but get better.”

If there is any one point that the entire Mines community can agree upon, it is that we want this great institution to become even better in the years ahead. I believe that together we will become the best.

### **Brajendra Mishra:**

The coronation of a king is a joyous occasion for the kingdom, for it symbolizes a new beginning. New aspirations are seeded and new hopes take birth. This investiture represents the dawn of a new era....

You have come to us at a time when the climb up Mount

Zion is a lot steeper than it appears and the challenges ahead are a lot heavier than those ten-pound rocks. But the journey to “M” will not be difficult for you, as the faculty of the School of Mines will be behind you. In return, the faculty seeks your support in enhancing the reputation of this institution as its stature is intimately intertwined with glories that the faculty brings and the quality that the students represent. We are indeed recognized for our commitment to exemplary teaching in the classrooms and the research in our laboratories. We solicit your help in preserving the value of our ability to reach out to each of our students....

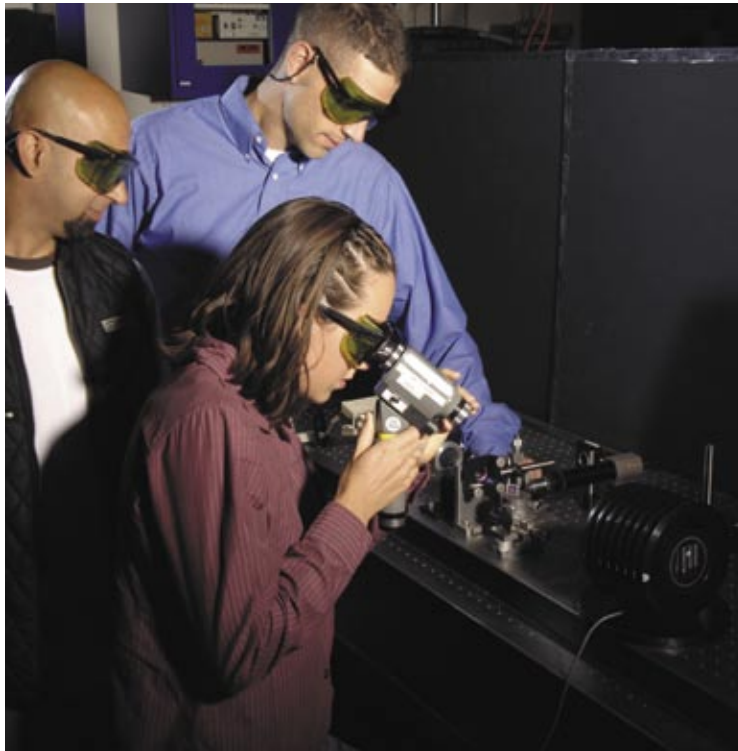
You have accurately assessed the challenges that we face. You have completed the first responsibility of a leader to define reality. Rosalynn Carter once said, “Any leader can take you where you want to go. A great leader takes you where you do not necessarily want to go, but ought to.” The time to face the challenges is now. The vision to be the best must not change, but the mission must recognize the changing times.... The seven strategies of the plan are indeed noble goals that seek well-developed and thoroughly reasoned strategies, properly formulated actions and the commitment to pursue them.

### **Robert Applegate:**

As students, we understand that it is the School’s mission to provide us with an excellent education, built on high-quality, demanding courses and cutting-edge research opportunities on the frontiers of knowledge delivered by dedicated faculty who are leaders in their fields. We want Mines to not only be a good place to be at, but also a good place to be from.

We want a thriving campus full of vitality and flowing intellectual discussion. We want the quality of the student body to be as high as possible and we would like to have male and female students from all over the country, all over the world, and all walks of life, learning with us. We want Mines, as an institution, to always strive to improve itself, and enrich its reputation in everything it does. We want Mines to anticipate the changes in the world and remain on the forefront of the technology that will shape the future in which we will live and work.

We want to be proud of the degrees that we earn, and we want those degrees to be recognized as top engineering and science degrees the world over. As alumni we want to be proud of this institution and we want Mines to represent us as we represent Mines. It begins here with the students, undergraduate and graduate. We are the legacy. **M**



## Life at Less than a Trillionth of a Second

By Larry Borowsky

# Phenomena

Light takes only one second to travel 186,000 miles. So how long does it take to travel a distance that's less than the width of a human hair?

You'd have to ask Jeff Squier.

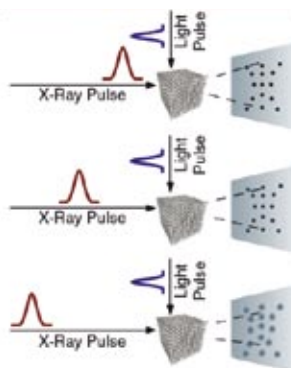
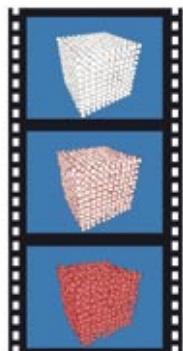
As head of Mines' PULSE (Photonics and Ultrafast Laser Science) laboratory, Squier marks time in femtoseconds—equivalent to one millionth of one billionth of a second. Compared to a femtosecond, the blink of an eye lasts an eternity.

Squier's specialized lasers can document events that occur within these incredibly transient intervals—"anything that happens in less than a trillionth of a second," he says. His lasers can record solids converting to liquids; they can be used to study each link in the intricate chain of chemical reactions that occurs when a plant's light receptors convert sunlight into nutrient energy.

"The technology has enormous potential for applications in such fields as health care, energy and nanotechnology," says Squier. And his work has helped put Colorado on the map as one of the nation's leading R&D centers in this discipline.

The PULSE lab is one of three Front Range facilities doing research with femtosecond lasers. The other two are at Colorado State University and the University of Colorado. "It's rare to have such a dense concentration of femtosecond-laser labs in one region," Squier says. What's even more rare is to have such a high degree of collaboration and coordination between ostensible research rivals.

Movie of Atomic Movement



Ultrafast X-Ray Diffraction

“The femtosecond-laser community isn’t very big,” says Squier. “Everybody knows everybody else. In Colorado we’ve developed a synergistic community, and that helps everybody do better work. Everyone’s aware of everyone else’s resources and strengths. We’re trying to take care of those strengths and not be competitive.”

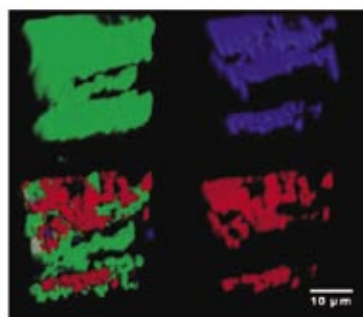
One of Squier’s major initiatives, a collaboration with Colorado State professor Randy Bartels and National Institute of Standards and Technology (NIST) scientist Scott Diddams, involves the development of a laser that functions as the light bulb in a microscope. By maximizing the power of the laser, the team is attempting to push biological imaging to previously unattainable levels of clarity. Using a laser light bulb, medical researchers will be able to see cellular structures in 3-D and to observe cellular functions in step-by-step detail.

“These tools will significantly impact our ability to study and understand fundamental biological processes,” says Squier. “We’ll be able to look at heart cells in greater detail than ever before. We’re also working at new methods of studying protein folding dynamics with these lasers.”

For investigations such as these, Squier’s lasers are capable of producing sequences of images that are akin to stop-action animation—they capture motion frame by frame. Squier and his team have produced such sequences to illustrate near-instantaneous events—for example, dynamic changes in the structure of a crystal. The first step is to mount a crystal and shoot an image of the crystal structure. Then Squier optically activates the crystal phase-transition process and programs the laser to shoot an image 300 femtoseconds into the process. The crystal is removed, and another is put into place containing an identical crystal; the same phase-transition process is initiated and photographed at the 400-femtosecond mark; then again at 500 femtoseconds, and so forth.

The resulting series of images, taken at 100-femtosecond intervals, constitutes a frame-by-frame “movie.” But creating each frame requires exhaustive precision and time-consuming setup. So, ironically enough, it can take 48 hours of nonstop lab work to create a 30-frame sequence of a process that only lasts a few trillionths of a second.

All of Squier’s lasers are homebuilt; PULSE is one of the few



3-D image of a heart cell taken with a microscope that uses femtosecond laser for imaging.

femtosecond-laser labs in the world to build and use all of its own equipment. “The advantage of building our own lasers,” Squier explains, “is that we can tailor the laser’s functionality to the experiment we want to conduct, rather than the other way around.”

As one example, Squier refined his lasers’ capabilities to support the development of a medical “laboratory-on-a-chip.” The research (in conjunction with Chemical Engineering Professor David Marr) required the creation of tiny physical and optical channels; accordingly, Squier developed lasers with advanced micromachining power, capable of creating and modifying nanostructures. These lasers cut the required pathways on the chip’s surface; the channels, in turn, direct cells (in single file) to pretreated testing areas. When fully developed, this technology will enable doctors to get near-instantaneous analysis of a blood sample, or any other specimen, right there at the patient’s bedside.

Other potential applications for femtosecond lasers include ultrafast x-ray imaging, spectroscopy imaging and ultrafast pulse measurement. “With so much fertile ground to plow,” Squier says, “collaboration among laboratories is that much more important.”

“We all need inexpensive, robust laser sources,” he says, “so we’re pooling our resources. That’s the beauty of this Front Range collaboration—we’re utilizing these resources really efficiently. The students at Mines are getting exposed to what the students at CSU and CU are doing. I love it, and the students love it.” [M](#)

*Freelance writer Larry Borowsky has contributed articles to Slate, WSJ.com, Sunset, 5280, and The Denver Post.*

# Transforming Higher Education

Colorado policymakers and the statewide business community embrace a long-term vision for our state as a place of opportunity: economically strong, culturally rich and environmentally healthy.

We, as leaders of Colorado colleges and universities, share this vision; its realization, however, depends on higher education's ability to educate a skilled workforce, generate ideas that create and attract new industries and jobs, educate citizens who are fully enfranchised in the democratic process and nurture a population with the knowledge to sustain a healthy state for generations to come.

Colorado must begin to link its aspirations for the future with the transforming capacity of its colleges and universities.

Over the past two decades, circumstances have prevented Colorado from fully capitalizing on its historic investment in its colleges and universities. A recent study found Colorado higher-education funding trails peer states by more than \$832 million; \$520 million of this is at our state's research universities.

Colorado is well above average in most respects—from the beauty of its environment, to the educational levels of its citizens, to the wealth and entrepreneurial spirit of its people. And yet, in this one area, we are significantly below average. It would require \$834 million simply to bring Colorado's higher-education funding up to the average, assuming all other states make no additional investments until we catch up. We don't believe this is a position most Coloradans find acceptable. Coloradans don't see themselves as below average.

Future investment in higher education can lead to the Colorado we all envision. But a vibrant system of higher education demands a new public partnership among state government, institutions and citizens. These points should be the basis of that partnership:

- Colorado's economic vitality and overall quality of life are our main concerns, and they depend on the state's placing a high priority on higher education.
- A spectrum of accessible community colleges, quality state colleges and universities, and globally competitive research universities is an asset to Colorado.

Colorado's quality of life and economic prosperity depend on the transforming potential of its colleges and universities.

Ranking of states on appropriations of state tax funds for operating expenses of higher education per capita, FY07. Population data based on July 2006 estimates retrieved from the U.S. Census Bureau on December 26, 2006.

- The skills acquired through a college education are essential for nearly every job Colorado hopes to add to its economy.
- Our graduates must be prepared to compete in a global marketplace, and they must represent all sectors of society.
- Colorado is committed to preparing all its youth for its best universities and highest-skilled jobs, and higher education has primary responsibility for ensuring P-16 teachers and principals are prepared to educate the next generation.
- Robust support for university-based research and graduate education, workforce development and training, and career and technical education is essential for Colorado's knowledge-based economy.
- Re-education and continued education of working adults through flexible and accessible means is the responsibility of Colorado's public colleges and universities.
- Rapid commercialization of ideas and the products of research plays a critical role in advancing Colorado's workforce and global competitiveness.
- Colorado depends on its colleges and universities to retain and capitalize on its potential in the 21st century.

Operating from these principles, a blueprint for progress in the decade ahead may be constructed around higher education's capacity to deliver transformation in P-16 education, labor quality, creation of businesses and jobs, global competitiveness, re-education opportunities for working adults, economic prosperity and overall quality of life.

Constructing and delivering on this design will require the state to undertake progressive steps to counteract those forces that have historically limited higher education's capacity to transform Colorado. We must:

- Achieve consensus among the governor, legislature, the business community and Colorado citizens on the importance of higher education to our economy and quality of life;
- Address fiscal constraints that have left Colorado institutions significantly behind their peers in funding levels and ability to compete for faculty and staff;
- Reform the statewide higher-education funding system to more fairly fund all of public higher education and its priorities, including economically important, high-cost programs in fields such as engineering, nursing, information technology, health care and the sciences;
- Recognize we must provide access for all qualified Colorado students along with revenue that enables institutions to offer services that raise the promise of reasonable student success;
- Acknowledge the economic importance of graduate education and address the real costs of attracting and retaining graduate students and faculty.

A growing body of economic research makes a strong case for the transforming impact higher education can have on an economy. Attracting new companies because of the overall quality of our labor and creating new jobs as a result of the ideas generated from research benefits everyone. Recent regional analysis from the Kansas City Federal Reserve identified especially the powerful role a doctoral degree-granting research university has on the prosperity of a region.

Postsecondary education is increasingly required for workers to earn self-sustaining incomes. In Colorado, the average hourly wage for occupations requiring postsecondary training was \$25.58, 80 percent higher than jobs not requiring such training. The state's 20 highest-paying occupations all require a college degree.

The number of Colorado high-school graduates is expected to increase 21 percent over the next decade—one of the five highest growth rates in the nation. And 79 percent of Colorado high-school students who go on to college will choose an institution in our state. This provides an opportunity to raise further the quality of our labor force via college and university education, but also presents a threat, the possibility of a growing under-educated workforce that limits future prosperity for all Colorado citizens.

With one of the most educated populations and the eighth-highest per capita income in the nation, Colorado already has a sound basis for capitalizing on these emerging opportunities and investing in higher education as one of the state's top priorities. Our public higher education system is diverse, with a strong network of community colleges, state colleges and universities, and four top-ranked research universities that all boast strengths in the sciences, technology, engineering and mathematics.

To capitalize on these strengths and better position Colorado for global competitiveness, we must begin to recognize higher education as a transforming force for our state. This will require the leadership of the governor and legislature, in cooperation with the business community, in placing the health and vitality of Colorado higher education at the forefront of the state's agenda in the decade ahead. We are committed to working in partnership with our state's leaders to ensure a future of long-term progress for Colorado higher education and the entire state. [M](#)

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*This column was submitted by:*

*Brad Bartel, president of Fort Lewis College;*

*Hank Brown, president of the University of Colorado;*

*Tim Foster, president of Mesa State College;*

*Nancy McCallin, president of the Colorado Community College System;*

*Kay Norton, president of the University of Northern Colorado;*

*Larry Edward Penley, chancellor of the Colorado State University System;*

*M.W. Scoggins, president of the Colorado School of Mines;*

*Bob Spuhler, president of Colorado Mountain College; and*

*David P. Svaldi, president of Adams State College*

*Originally published in The Denver Post's Perspective section on January 7, 2007.*

# The Network

## Introducing Associate Director of Campus Programs and Membership Services

In December Elizabeth “Liz” Garcia joined the staff of the Alumni Association as associate director of campus programs and membership services. In short, Liz will be responsible for planning Reunion, Homecoming and other campus activities for alumni, in addition to supporting membership-related activities. She hails, most recently, from Regis University, where she worked in online admissions. Liz also has experience working with alumni from Up With People, a nonprofit international education organization. We asked Liz about her new post with the CSMAA:

*What are your plans for the Mines Alumni Association?*

My principal accountabilities fall into three main areas: volunteer management; event planning; and membership services and growth. I am looking forward to planning, promoting, and administering alumni and alumni-student events, such as the annual reunions, Homecoming, class events, seminars and other

programs. I will be working closely with a network of volunteers, who will be my partners in making these events a fabulous success! I will also explore new ideas that will incorporate value-added membership services for alumni through partnerships both locally and nationally. Opportunities for outreach to other departments on campus, students, alumni, faculty, local businesses, and online communities will help solidify and grow CSMAA membership, while benefiting alumni and the School. I feel that the Mines Alumni Association is moving forward with new and invigorating ideas with technology playing a key role, and I am excited to be a part of that.

*How do you plan to approach your job and integrate into the Mines community?*

I believe networking and meeting as many alumni, faculty and staff is always the best way to contribute to the goals and objectives of the organization, and Mines has such a strong community network already! In working with alumni, both locally and nationally, as



well as cross-campus departments, I plan to keep alumni on the forefront of the Mines community through a variety of strategies: First, develop an online community, where alumni can communicate with one another by posting profiles and pictures, sending emails, and reading the latest updates of their fellow classmates and friends. This would serve to bring together alumni from around the globe, and foster new relationships through a



global network. Second, I plan to serve as a liaison with other campus departments and build partnerships that will benefit both students and alumni, such as Career Services, the Minority Engineering Program and Admissions. Third, as a member of the CSMAA team, my overall objective is to reach out to the business community and establish strategic partnerships that would benefit Mines alumni via membership services. The CSMAA and the alumni are faced with a valuable opportunity to work together and grow the organization through symbiotic partnerships, technology and volunteer opportunities.

*What are your educational qualifications?*

Science has always been one of my interests, so I received a bachelor's

degree from the University of Colorado Boulder in environmental biology. Currently, I am working on my master's degree in management from Regis. I believe the combination of science and management has helped prepare me for operations management, both on the micro and macro levels of the organizations I have been a part of, and I am pleased to bring these skills to Mines.

*What message or messages would you like to share with alumni?*

I look forward to working together with alumni, faculty, staff and the global online community to help make the Mines Alumni Association a cornerstone of new ideas and old traditions, while ensuring such contributions play a key role in the future of CSMAA.



## Springs Spectacular

A reception was held in Colorado Springs to introduce President and Mrs. Scoggins to the Mines community. Here Karen and Bill pose with Kenji Farinelli, section coordinator for Colorado Springs.

## CSM Alumni Association

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Eric May '99  
President-elect

Joseph Mahoney '86  
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## The Career Column

By Richard Hewitt '82, MSc '89, MSc, PhD '92

In this inaugural installment of "The Career Column," I'll begin with a question that may be on your mind. *Why a career column when jobs (and salaries) for Mines grads are at record levels?*

The short answer is *because you need one.*

Sounds presumptuous, but the national data suggest that one-third of the U.S. workforce changes jobs each year. We also know that having a job (or multiple offers for that matter) doesn't guarantee success or happiness.

The history of natural resource-based industries is one of boom and bust, and while it appears we are in a boom cycle today, it was only three or four years ago that jobs were difficult to land.

With that boom and bust scenario in mind, this column is dedicated to assisting three groups of alumni: those who are currently looking for a job, those who will be looking for a job, and those who may like their current job, but would like to accelerate their careers by garnering more responsibility, more money, or both. And what self-respecting Mines grad doesn't want to advance their career by landing a promotion or earning more money?

To help advance your career, I offer a statement that may sound confusing: *If you are unemployed or underemployed, don't waste your time looking for a job.* Yes, that's right. If you need a job, don't waste your time looking for one. You'll only end up stressed out and disappointed.

Your time is better spent looking for problems to solve. Think about it: Jobs exist because problems exist.

*Problem:* Too many dry holes.

*Solution:* Hire someone who understands geology and knows where to drill.

*Problem:* Seismic data is un-interpretable.

*Solution:* Hire someone who can process and interpret noisy data.

*Problem:* Drill bit stuck down hole.

*Solution:* Hire someone who can extract the bit and complete the well without losing the hole.

Translation: If you're not spending at least 90 percent of your time researching problems, you're wasting your time. The people who land jobs quickly, without all the stress, intimately understand the root causes of problems and how to solve them.

The key to landing a job and advancing your career has always been about solving other people's problems. In this column, we'll focus on ways to help you turn your hard-earned problem solving skills into dollars.

I'll discuss this in more detail in the next edition of The Career Column. For now, I'll close by asking you to consider the following question: *Even in the worst of times, when no one is hiring, do you really believe that companies have solved all their problems?*

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*Richard Hewitt, founder of High Impact Career Products, has spent the past five years developing and testing America's only patent-pending job finding system, [www.impactcareer.com](http://www.impactcareer.com). Questions and comments can be emailed to Richard Hewitt at [richard@impactcareer.com](mailto:richard@impactcareer.com).*

## Sig Ep Splash

Sigma Phi Epsilon held its third Colorado Delta reunion in Reno, Nev., last summer. Fifty-three Sig Epps and friends gathered together for a weekend of fun. The group plans to repeat the reunion in 2009.





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800 Eleventh Street, Golden, CO 80401 303.279.0100



## Grand Canyon Journey

**Steve Sonnenberg** '74, MSc '75, PhD '81 led alumni and friends on a spectacular 180-mile 7-day trip through the Grand Canyon last summer. It was a joint venture between Rocky Mountain Association of Geologists and Colorado School of Mines Alumni Association. View video highlights online at [www.oia.mines.edu/alumni/travel](http://www.oia.mines.edu/alumni/travel). Sonnenberg is repeating the adventure for the Alumni Association in 2007, but there is a waiting list.



## Metallurgy Meets Ski Industry

Professor David Matlock, with several CSM graduates, attending his presentation entitled Metallurgical Engineering and the Ski Industry: Applications of Metallurgical Failure Analysis, to the Moline, Ill., ASM Chapter. From left to right: **Dan Wallace** '98, **Jim Wong** '92, M Eng '01, Professor Matlock, **Roger Cirimotich** '73 (from Professor Matlock's first year at CSM) and **John Gerczak** '02.

# Fast Forward

Class Notes  
 Weddings  
 Alumni Profiles  
 Births  
 Passings

## 1953

**Jean F. Clement** is now retired in Chantilly, France.

## 1957

**Walter W. Tyler** is president and owner of TPI Properties LLC. He lives and works in Lakewood, CO.

## 1958

**Steve K. Kyriakides** is retired and lives in St. John, IN.

**William Wahl** writes that he is very interested in mining history and is now chairman of the Nevada Boomtown History Event, which will take place in Winnemucca, NV, in either summer or early fall. The e-mail site is: [www.deathvalley49ers.org/boomtown.htm](http://www.deathvalley49ers.org/boomtown.htm) if you are interested in attending.

## 1959

**William A. Rehrig** is currently a geological consultant, working in minerals exploration, ore deposit and regional structural analysis, and prospect evaluation throughout North and South America.

## 1960

**R. Glenn Vawter** is oil shale division manager for E. G. L. Resources, Inc. He lives and works in Glenwood Springs, CO.

## 1962

**Charles Burt** writes, "Retired three years ago and bought a 38-foot Ocean Alexander Trawler in Seattle, WA, where our youngest daughter lives. I spent the last three summers refitting her. She is ready now for serious cruising. We still have our Texas address. Our plan is to spend our summers in Seattle cruising and visiting with our family there, and the rest of the time in Texas at our home visiting with our oldest daughter and her family. I plan to attend the May 9-12, 2007 Reunion weekend and look forward to visiting the campus and seeing alumni."

## 1965

**Richard C. Hecox II** has retired from Valero and is a process engineer for Jacobs Engineering in Golden, CO.

## 1966

**Arezki Rekouche** is retired from the chemical and pharmaceutical industries and is now an independent consultant specializing in evaluation and development programs for the chemical industry. He lives in Alger, Algeria. His e-mail is [rekdz@yahoo.fr](mailto:rekdz@yahoo.fr).

## 1967

**Joseph D. Stewart** is asset manager for the Berry Petroleum Company in Denver, CO.

## 1968

**Bruce R. Palmer** is professor of chemical engineering for the Petroleum Institute. He lives and works in Abu Dhabi, United Arab Emirates. His home e-mail is [brpalmer@emirates.net.ae](mailto:brpalmer@emirates.net.ae) and business is [bpalmer@pi.ac.ae](mailto:bpalmer@pi.ac.ae).

## 1969

**Alan D. Bell** was named to Treador Resources Corporation's board of directors as chairman of its audit committee. Formerly the director of Ernst & Young LLP's energy practice in the Southwest U.S. until his retirement in June 2006, Bell has extensive experience in the international oil and gas industry in Africa, Australia, Europe and the Middle East.

**W. Dennis Heagney** was appointed to president and CEO of Viking Offshore USA.

## 1970

**Thomas Monchak** is retired in Phoenix, AZ.

## 1971

**W. Craig Blasingame** is chief technology officer for Mergellina Designs Inc. in Carlsbad, CA.

**Christiaan M. Crous** is retired and lives in Chapala, Jalisco, Mexico. His e-mail is [iris3r@aol.com](mailto:iris3r@aol.com).

# Weddings

**Chelsey Mead '03** and **Chris Thompson '04** were married in Palmer Lake, Colo., on September 23. Miners in attendance were **Rachel Fallon Morrish '04**, **Charles Durkoop '04**, **Jamie Henderson Davenport '04**, **Emma Nicoletti '02**, **Heidi Sporleder '04** and **Sarah Read '03**. Chelsey and Chris are both lead engineers for IM Flash Technologies and live in Lehi, Utah.



**Kari Gonzales '02** and **Joseph Brosseau '03** were married June 24, 2006, in Breckenridge, Colo. Both are senior engineers for the Transportation Technology Center in Pueblo, Colo.



**Stephanie Wolfe '03** and **Dustin Bennetts '03** were married on Sept. 30, 2006, in Golden, Colo. In attendance were Mines alumni **Jeremy O'Brien '03**, **Amber Smith '03**, **Ted Wolfe '84**, **Jenny Pergola '03**, **Vern Baca '03**, **Chris Bradley '03**, **Aaron Langness '03**, **Patrick Anderson '03**, **Michelle Parrott '05** (not pictured), **Ruthie Swartzlander '03** (not pictured), **Mike Swartzlander '02**, **Lauren Evans '82** (not pictured), and **Frank Seeton '47** (not pictured). The couple currently resides in Lakewood, Colo.

## 1973

**Richard J. Lacouture** is general counsel for ExxonMobil Yuegen Kaisha in Tokyo, Japan.

**George L. Lane** is a senior engineer for Norwest Questa Engineering in Golden, CO.

**Clyde H. Peppin** is senior project manager for McIntosh Engineering, Inc. in Tempe, AZ.

**Robert L. Purswell** is retired in Basin, WY.

**John Robertson III** is manager of resources and geology for Cemex, Inc. He lives and works in Phoenix, AZ.

## 1974

**Stanley J. Gradisar** reported that he joined the Denver office of Merchant & Gould, an intellectual property and litigation law firm, as an associate attorney. Stanley practices intellectual property law with an emphasis on domestic and international patent prosecution, and counsels clients on various intellectual property matters, including licensing, patent infringement and patent validity issues.

**Richard P. Mignogna** is a professional engineer for the Colorado Public Utilities Commission in Denver, CO.

**Stewart G. Squires** is a geophysicist for FIML Natural Resources LLC in Denver, CO.

## 1975

**Mark T. Kinevan** is vice president of trading for The Energy Authority. He lives and works in Jacksonville, FL.

**Rich Rein '75, '77, MSc '86** writes, "I have returned to Colorado after a 13-year absence and am renovating my house on Floyd Hill while I complete my current assignment as the underground project manager at the EKATI Diamond Mine for BHP Billiton in the Northwest Territories, Canada.

**Rodney W. Roberts** is operations manager for Halliburton Energy Services in Houston, TX.

**William S. Robie** is land development consultant for Land Development Consulting Services. He lives and works in Golden, CO.

**Larry L. Turner** is mine manager for MK Resources Company in Kingsford, MI.

## 1976

**Rene R. St. Pierre** is division drilling manager for Chesapeake Energy Corporation in Oklahoma City, OK.

**Richard R. Usery** is mine development coordinator and assistant to the president for MEPCO, Inc. He lives and works in Morgantown, WV.

## 1977

**Randy D. Roberts** is managing partner for GeoMinUSA. He lives and works in Cañon City, CO.

**Joel E. Scott II** is exploration manager for Oxy Libya. His home e-mail is jescott2@hotmail.com and business is joel\_scott@oxy.com.

**Christopher C. Traeger** is senior geophysicist for Plains Exploration & Production Company in Houston, TX.

**David M. Vardiman** is manager of exploration development for Quadra Mining Ltd. of Vancouver, BC. He is currently working on a project with Robinson Nevada Mining Company in Ruth, NV. He lives in Woodland Park, CO.

## 1978

**Francine D. Schlaks** is attorney and mediator for the U.S. Equal Employment Opportunity Commission (EEOC). She lives and works in Detroit, MI.

**James K. Swain** is lead petroleum engineer for Chevron in Luanda, Angola. His e-mail is JamesSwain@chevron.com.

## 1979

**David L. Bartel** is owner and manager of Fossil Rock, LLC in Aurora, CO.

**Daniel R. Lockwood** is vice president of engineering for New Tech Engineering. He lives and works in Fort Worth, TX.

**Alan J. Mencin** is project engineer for Harris Group Financial Consulting in Denver, CO.

**Martin D. Wittstrom, Jr.** is manager of international exploration for Reliance Industries in Navi Mumbai, Koparkhairane, India. He lives in Calgary, AB, Canada. His e-mail is MDWittstrom.77@alum.mines.edu .

## 1980

**Michael Banschbach** is a natural gas, crude oil and electric power marketing consultant based in Midland, TX, working in Texas, New Mexico, Colorado and Utah.

## 1981

**Michael S. Smith** is director of zinc for Australia/Asia for Xstrata Zinc in Toowong, Queensland, Australia. He lives in Chapel Hill, Queensland, Australia. His e-mail is msmith@xstrata.ca.

**Donald M. Whitmer** is division geophysical advisor for EOG Resources, Inc. He lives and works in Tyler, TX.

**Stephen R. Wolfe** is senior production engineer for Bonanza Creek Energy in Denver, CO.

## 1982

**Kevin W. Conroy** is principal of Golder Associates in Lakewood, CO.

## 1983

**James E. Banaszak** is chief technical officer for OpenCEL in Glencoe, IL.

**Gary J. Sanchez** is manager of transportation and storage for the National Fuel Marketing Company in Denver, CO.

## 1984

**John F. Bauer III** is project manager for Ascendent Engineering & Safety Solutions LLC in Wheat Ridge, CO.

**Arvind K. Garg** is corporate planner/ economist for Petroleum Development Oman in Muscat, Oman. His e-mail is arvind.garg@pdo.co.om.

**Robert K. Miller** is financial analyst for the Intermec Corporation in Everett, WA.

**Thomas J. Myers** is HSE manager of refining for ConocoPhillips in Houston, TX.

**Brett D. Smith** is the owner of Environmental Compliance Associates, LLC, in Richland, WA. ECA is a registered engineering company in the state of Washington and was founded in 2003.

## 1985

**Stephen B. Batman** is open pit manager at the Telfer Gold Mine for Newcrest Mining Limited in Telfer, Australia. His e-mail is kal.batman@bigpond.com.

**Javier Luengo Delgado** is director of GDP Generacion S.A. He lives and works in Guatemala City, Guatemala. His e-mail is jld@intelnett.com.

**Gregg P. Rago** is an account manager for Halliburton in Leatherhead, Surrey, U.K. His e-mail is grago@lgc.com.

## 1986

**James A. Alsup** is area manager of the Eastern Gulf of Mexico for Anadarko Petroleum Corp. in Houston, TX.

**Tamra Lester Beaubouef** is sales manager for Airborne Imaging. She lives and works in Spring, TX.

**Eric J. Martins** is market manager for BOC LTD, The Linde Group in Rotherham, U.K. His home e-mail is eric.martins@btinternet.com and business is eric.martins@boc.com.

## 1987

**Todd Courtney** has a new position as regional manager, support services, for Terex Utilities based in Portland, OR.

**Gordon L. Fellows** is technical services manager at the Bulyanhulu Gold Mine for Barrick Tanzania in Dar es Salaam, Tanzania. His home e-mail is the\_fellows\_5@yahoo.com and business is gfellows@barrick.com.

## 1988

**Monte L. Madsen** is senior operations engineer for Quantum Resources Management in Denver, CO.

# Profile

## Tim and Bernadette Marquez Clear Path to College for Denver High School Grads

Thomas Cooper, lightboximages.com



A visionary \$50 million gift from **Tim Marquez** '80 and Bernie Marquez to establish the Denver Scholarship Foundation will put a college education within reach for hundreds of Denver Public Schools students. Beginning this spring, the Foundation's landmark program will cover all unmet financial need for graduates of South, Lincoln and Montbello High Schools to attend any technical college or two- or four-year school in Colorado. The Marquezes have challenged others in the community to help build a total endowment of \$200 million in order to extend the program to include all Denver high schools.

Tim graduated from Lincoln High School in 1976 and went on to earn his degree in petroleum engineering from Mines. He is founder, chairman and CEO of Denver-based Venoco, Inc. Bernie is a graduate of Michigan State University and works as a nurse at St. Luke's Medical Center in Denver.

The Marquezes made Mines history in 2005 by giving the largest-ever individual donation to the School—\$10 million toward construction of a new petroleum engineering building, which will be named in the couple's honor.

**Brian A. Warren** is president of Interfaces, Inc. He lives and works in Louisville, KY.

### 1989

**Matthew E. Donohue** is a civil engineer for Trans Tech Consultants. He lives and works in Windsor, CA.

**Thomas M. Haard** is senior project staff in the Applied Physics Laboratory at Johns Hopkins University in Laurel, MD.

**Tom Walker** writes, "The family and I moved to Muscat, Oman, in August 2005 from Doha, Qatar. I still work for Occidental. Now with Occidental Mukhaizna LLC, heavy oil



development. I'm the production engineering team leader here." Tom and his family posed at the Wahiba Sands area in Oman. From left to right: Tom, sons Joel and Dalton, and wife Jennifer.

### 1990

**Mary A. Graham** is project manager for Utility Engineering in Denver, CO.

### 1991

**Rachid Chebbi** is a professor of chemical engineering at the American University of Sharjah in Sharjah, United Arab Emirates. His e-mail is rchebbi@aus.edu.

**Sheila R. Cross** is a civil engineer for Cross Consulting LLC in Buena Vista, CO.

**David J. Hagerman** is vice president and general manager for Martin Marietta Materials in San Antonio, TX.

**Jose M. Madero** is the managing director for Monsanto Australia/New Zealand. His e-mail is josem.madero@monsanto.com.

**Shawn Olson** is business unit manager for Sundyne Corporation in Arvada, CO.

### 1992

**Jose V. Gomez** is senior project engineer for M. W. Kellogg Limited in South Ruislip, Middlesex, U.K. His home e-mail is jvg1960@gmail.com and business is jose.gomez@mwkl.co.uk.

**Todd M. Harwood** graduated in June of 2006 with an MBA from the University of North Carolina, Charlotte. He is assistant vice president of financial systems for the Wachovia Corporation in Charlotte, NC.

**Penny J. Pettigrew** has been named the Ares I First Stage Requirements and Verification Team Lead for NASA's Crew Launch Vehicle, which is scheduled to replace the Space Shuttle in 2012.

**Adam J. Rompage** is a senior engineer for Honda R&D Americas. He lives in Dublin, OH.

**Steve Tua** writes, "Living with my wife, Jane, in Bowling Green, KY; working as an operations team leader at Logan Aluminum in Russellville; recently became a lean Six Sigma Black Belt; recently received my MBA from Western Kentucky University."

**1993**

**Wes Dickhut** is a geotechnical engineer with John P. Stopen Engineering Partnership in Syracuse, NY. **Kirsten Wynn Dickhut** is an independent environmental consultant and full-time mom to Tia (11), Carl (9), Kurt (7), Barbara (3) and Annelise (1). [see photo in Class of 2028]

**Troy Gorrell** writes, "I am now the quality manager for the U.S. operations of PCC-Advanced Forming Technology, based in Longmont, CO. I am also the president of the Colorado chapter of the Toyota Territory Offroad Association."

**Derek J. Ulehla** is senior engineer for CDM in Denver, CO.

**Khanh Q. Vu** is director of the Minority Engineering Program at Colorado School of Mines.

**1994**

**Hisham A. Al-Siyabi** is exploration geologist for Shell Exploration & Production Company. He lives and works in Houston, TX.

**Karen G. Lillrose** is immigration manager for McKesson Corp. in Louisville, CO.

**Eric J. Mulder** is a quality engineer for Medtronic Inc. He lives in Columbia Heights, MN.

**Robert W. Patlovany** is powerplant engineer for Adam Aircraft.

**1995**

**Anna Gray Hanley '95** is currently senior project engineer at VECO USA, Inc. in Greenwood Village, CO, and husband **David Hanley '06** is a design engineer at Merrick in Aurora. They live in Highlands Ranch with their two dogs, Foster and Holli, and their new baby girl, Adeline Grace. [see photo in Class of 2028]

**Brian L. Haverland** is senior supervisor for PT Newmont Nusa Tenggara for Newmont Mining Corporation. He lives in Littleton, CO.

**Kash H. Kelloff** is managing consultant for Performance Associates International, Inc. He lives and works in Tucson, AZ.

**Roger M. Kifer** is a product engineer for Woodward in Loveland, CO.

**Richard J. Murphy** is senior scientist for ARCADIS G&M Inc. in Highlands Ranch, CO.

**Justin W. Oleson** is general superintendent of capital projects for the Freeport Indonesia Company in Tembagapura, Papua, Indonesia.

**Jane E. Elkins Rabinovitch** is a consultant for JR Consulting. She lives and works in Franklin, TN.

**Brian L. Vialpando** is product engineer for Texas Instruments Inc. He lives and works in Dallas, TX.

**1996**

**Shanna Carroll French** is a designer for Ross Reels in Montrose, CO.

**James E. Fueg** is technical and permitting manager for Barrick Gold Corporation in Anchorage, AK.

**Darvin H. Jones** is a project manager for Noble Drilling Services Inc. in Sugar Land, TX.

**Darvin H. Jones** is senior project manager for Cameron International in Houston, TX.

**John D. Rogie** writes, "In October 2006 I formed California Push Technologies Inc., a new San Francisco Bay Area-based provider of cone penetration test (CPT) and direct-push soil sampling services. CPT Inc. supports geotechnical and environmental engineering projects throughout California."

**Rajiv Srivastava** is associate director for Florida International University in Miami, FL.

**1997**

**Molvipa Boonpirom** is a process engineer for the Fluor Corporation in Sugar Land, TX.

**John G. Cichon** is a process engineer for Archer Daniels Midland in Decatur, IL.

**Randy G. Edelen** is a project engineer for Halliburton Digital and Consulting Solutions in Denver, CO.

**Tord V. Jonasson** is a senior industrial engineer for Delphi in Saginaw, MI.

**Jennifer L. Kramer Manley** writes, "From 1997 to 2004 I lived and worked in Southern California at Guidant, a medical device company. I married my husband, Lance, in July 2002. In December 2004, we moved to Flagstaff, AZ, where I started work at Gore. We were blessed with a son in March 2005 and have really been enjoying being parents. My husband got a job in Colorado Springs in June 2006, so here we are settled in Pueblo!" Jennifer is a senior

R&D engineer for Spectranetics in Colorado Springs, CO.

**Antonio (Tony) J. Miller** writes, "In the fall of 2006, I finished a master's degree in health sciences and technology at MIT. I am now a senior electrical engineer at Motorola doing R&D in the Acoustic Technology Center. My research specialization is in acoustics, auditory perception and signal processing. I live in Miami with my wife, who is a research scientist at the University of Miami Medical School."

**Judith L. Samuelson** is senior process engineer for Intel Corporation. She lives and works in Portland, OR.

**Thomas Simar** is senior asset manager for Dexia Asset Management. He lives and works in Brussels, Belgium. His e-mail is simarheyne@skynet.be.

**Dickie P. Smith** is construction technologies program director for Morgan Community College in Fort Morgan, CO.

**1998**

**Wasim I.S. Al-Kabour** is lead project engineer for Saudi Aramco Company in Dhahran, Saudi Arabia.

**Brian G. Bengtson** works in market fundamentals and strategic planning for EnCana Oil and Gas (USA) Inc. He lives and works in Denver, CO.

**Michael R. Ross** received his PhD in aerospace engineering from the University of Colorado in August 2006.

**Bryan D. Sendelweck** is a process engineer for ATMEL Corporation. He lives and works in Colorado Springs, CO.

**Morgan Sykes '98**

was promoted to land development manager at Kirkham Michael in Omaha, NE. In his new role, Morgan will focus on management responsibilities of the land development team, as well continuing to work on land development projects, including residential and commercial subdivisions. Morgan is licensed in the states of Nebraska, Iowa, and Colorado. Since inception in 1946, Kirkham Michael is a service provider of engineering, planning, design, and construction services.





# Profile



## The Prize of X PRIZE

**Tom Vander Ark '81**, the former executive director of education for the Bill & Melinda Gates Foundation, has been named president of the X PRIZE Foundation. The X PRIZE Foundation is an educational nonprofit prize institute whose mission is to create radical breakthroughs for the benefit of humanity.

In October 2004, the X PRIZE Foundation captured world headlines when Mojave Aerospace Ventures, led by legendary aircraft designer Burt Rutan and Microsoft Co-founder Paul Allen, built and flew the world's first private vehicle to space twice in two weeks to win the \$10 million Ansari X PRIZE. The Foundation has since expanded to offer new prizes for breakthroughs in medicine, healthcare, energy production and consumption, education and the automotive industry. In October 2006, the X PRIZE Foundation announced the \$10 Archon X PRIZE for genomics, which will reward the first private effort to map 100 human genomes in 10 days, ushering in a new era of personalized preventative medicine.

"The philanthropic model is changing and X PRIZE is leading the way," according to Vander Ark. "The X PRIZE for private

spaceflight has already established the foundation as the leading model for fostering innovation through competition. That award and others from X PRIZE drive the delivery of research and development that is more than ten times the value of the purses. I look forward to bringing this proven and evolving competitive model to new arenas."

At the Gates Foundation, Vander Ark developed and implemented more than \$3.5 billion in scholarship and grant programs to improve education throughout the United States. He brings with him a commitment to charitable giving that has the most widespread and ongoing impact on society.

Prior to his role with the Gates Foundation, Vander Ark served as superintendent of one of Washington State's larger school districts that has been recognized for narrowing the achievement gap and reducing administrative cost. Vander Ark also has extensive experience in the private sector, serving as a senior executive for a start-up retail chain that achieved \$5 billion in revenue, as well as management and consulting experience in energy, telecommunications and business formation.

## 1999

**Peter R. Bunning** is an electrical designer for the Agar Corporation. He lives and works in Houston, TX.

**Christopher J. Greenlee** is an exploration geologist for Latigo Petroleum, Inc. (Pogo Producing Co.) in Tulsa, OK.

**Michael Hundley** writes, "I graduated from the University of Missouri – Kansas City School of Law in May of 2005 and have been admitted to practice in both Missouri and Kansas. Currently, I am an associate attorney with the law firm of Levy & Craig in Kansas City, MO, practicing in the areas of construction law and business litigation."

**Angela C. Pardikes** is a senior systems engineer for Lockheed Martin Corporation. She lives in Thornton, CO.

**Daniel C. Quigley** is project manager for Buckhorn Geotech. He lives and works in Montrose, CO.

**Aleksandr Safray** writes, "[I] got married to Anzhelika on Sept. 9, 2005, and our first baby was born on Dec. 14, 2006."

**Zhongben Wang** is a software engineer for MIT, Inc. in Englewood, CO.

## 2000

**Jeffrey S. Calhoun** is logistics officer for the U.S. Department of State in the Joint Management Office in the American Embassy in Vienna, Austria. He just began a three-year tour in Vienna. His home e-mail is jeffrochicago@hotmail.com and business is calhounjs@state.gov .

**Matthew Lengerich** is currently living in Weipa, Australia, where he works as a production superintendent, East Weipa Mine, for Rio Tinto Aluminum Weipa. Matt and his wife Heather moved to Far North Queensland with their two children, Samantha and Jacob.

**Matthew S. Mitchell** is a test engineer for Puget Sound Naval Shipyard. He lives and works in Bremerton, WA.

**Marcus D. Self** is a senior process engineer for Valero Energy Corporation in Port Arthur, TX.

**David E. Stillman** is a research scientist for Southwest Research Institute in Boulder, CO.

## 2001

**Daniel S. Baker** is a graduate student at the Colorado School of Mines.

**V. Renae Binstock** is an engineering project manager for Narvarro Engineering and Research in Lakewood, CO. She is also a captain and reservist in the US Army.

**Arthur B. Brown** is regional business manager for Fenner Dunlop Americas.

**Hoyt Brown** writes, "I received a passing grade on the October 2006 PE exam for the State of Texas."

**Lana M. Edwards** is a project engineer for General Electric. She lives in Sugar Land, TX.

**Juan-Carlos Guerra** is a federal agent in Baltimore, MD. [see photo in Class of 2028]

**Jake Happs** and **Renee Lagutaris Happs** are married and living in Mesa, AZ, and are expecting their first child in June. Renee is a research technologist for Mayo Clinic Arizona and Jake is a senior software engineer for General Dynamics.

**Juan Pablo Moriamenz** writes, "At the moment I am working as consulting engineer at LQS Latin America, located in Santiago, Chile. My job requires that I have to move to Mali for one year effective January. The job involves mine planning."

**Kyle C. O'Brian** is a structural designer for Bornengineering in Westminster, CO.

**Amy L. Osborn** is a geologist for Chevron. She lives and works in Houston, TX.

**Joshua J. Viets** is a senior reservoir engineer on the Permian Oil Team for ConocoPhillips in Houston, TX.

## 2002

**Jon Casten** writes, "[Our] baby boy, Brendyn Lloyd Casten, was born on July 23, 2006, in Greeley, CO [see photo in Class of 2028]. I am currently a sales manager for construction equipment manufacturer, Genie Industries.

**Brandon Desh** and Vicky Howsden were married at Berean Church in Lincoln, NE, on Nov. 10, 2006.

**Shawna M. Gilbertson** is a geologist for EnCana Oil & Gas (USA) Inc. in Denver, CO.

**Durga Prasad Kar** is a senior rate planner for Wisconsin Public Service Corporation. He lives and works in Green Bay, WI.

**Kenneth M. Light** is a graduate student at Stanford University in Palo Alto, CA.

**Edgar I. Mellor III** is a reservoir engineer for St. Mary Land & Exploration Company. He lives and works in Houston, TX.

**Eric R. Miller** is a production engineer for Southwestern Energy Company. He lives and works in Magnolia, TX.

**Jason A. Rurup** is capacity planning analyst for Xcel Energy Inc. in Denver, CO.

**Joseph Sorenson** earned his Microsoft Certified Systems Engineer (MSCE) certification for Windows Server 2003. His company, Flexant, a Colorado-based IT consulting firm, reported that it normally takes 12 to 18 months to earn this certification, but Joe completed the requirements in just eight months.

## 2003

**Fahad Al-Faresi** writes, "Well, I got married in 2005 and I have a four-month-old son now. Plus, I'm moving up in the Kuwait Oil Company, where I'm now in charge of \$3M worth of oil a day. Ain't bad, huh! Miss life back at Mines, that's for sure."

**Ajab M. Al-Otaibi** is an assistant teacher in the Petroleum Engineering Department at the College of Technical Studies for the Public Authority for Applied Education & Training (PAAET) in Shuwaikh, Kuwait. His e-mail is [ajab@paaet.edu.kw](mailto:ajab@paaet.edu.kw).

**Brandyn J. Bair** is a design engineer for Schmueser Gordon Meyer Consulting in Glenwood Springs, CO.

**Matthew C. Balzer** is vice president of sales for MMS WEST in Denver, CO.

**Paul Bartos** MSc '03, PhD '06 left his post at Mines' Geology Museum and has joined Esperanza Silver Corporation, where as a vice president/chief geologist, he will assist them in their quest for new precious metal deposits, principally in Mexico and Peru.

**Courtney Bird** was selected as the Society of American Military Engineers (SAME) Young Engineer of the Year. She was highlighted in the *Houston Business Journal* and was honored at the Engineers Week (E-week) celebration in Houston, TX, in February.

**Orison J. Bullard IV** is an electrical engineer for Saipem America. He lives and works in Houston, TX.

**Jon Collis** sends this update: "I graduated with a PhD in mathematics from Rensselaer Polytechnic Institute [Troy, NY] in May 2006, and was awarded a U.S. Office of Naval Research Postdoctoral Award (one of three nationally) in ocean acoustics. I am currently working for Boston University and am a guest investigator at the Woods Hole Oceanographic Institution."

**Graham C. Denton** is a production manager for Woodley Architectural Group in Highlands Ranch, CO.

**Rebe J. Feraldi** is a student at the University of California at Santa Barbara.

**Qiang He** earned a PhD in computer science from the University of Louisiana at Lafayette.

**Michael T. McNish** is superintendent for Flatiron Constructors in Longmont, CO.

**Remco Meeuwis** is an analyst of oil and gas structured finance for the ING Group. He lives and works in Amsterdam, Netherlands. His e-mail is [rmeeuwis@gmail.com](mailto:rmeeuwis@gmail.com).

**James C. Page** is a graduate student at the Colorado School of Mines.

**Timothy J. Schulte** relocated to Davidson, NC, with his company, Ingersoll Rand. He works as an assistant product manager of compact equipment attachments.

**John D. Shrewsbury** is a senior metallurgist for Newmont Gold Company in Englewood, CO.

**Steve Stoddard** writes, "I'm at Camp Victory, Baghdad. I'm serving as lead operations research analyst for the Multi-National Corps - Iraq."

**Hans H. Wychgram** is a drilling engineer for Newfield Exploration Company. He lives and works in Denver, CO.

## 2004

**Tamara N. Hockett** is a civil engineer for Martin/Martin in Lakewood, CO.

**Nathan K. Jenks** is a geological engineer for the Western Federal Lands Highway Division. He lives and works in Vancouver, WA.

**Pongkit Luksamepicheat** is a commercial coordinator for PTT Exploration & Production Plc. in Thailand. He lives in Muang, Nakon Pathom, Thailand.

**Mark M. Montano** is an engineer for O&G Environmental Consulting in Englewood, CO.

**Samuel A. Pannunzio** is an operations engineer for Atwood Oceanic Inc. He lives and works in Houston, TX.

**Robert L. Parkin** is an estimator for Fiore & Sons in Denver, CO.

**Aaron N. Rich** is a software developer for Northrop Grumman at Schriever Air Force Base. He lives in Colorado Springs, CO.

**Christine L. Szymanski** is a petroleum engineer for Noble Energy Inc. in Denver, CO.

**Jennifer Tafoya** writes, "I am an environmental engineer with Science Applications International Corporation (SAIC) in Lakewood, CO."

**Christopher D. Wagner** is a metallurgical engineer for First Solar.



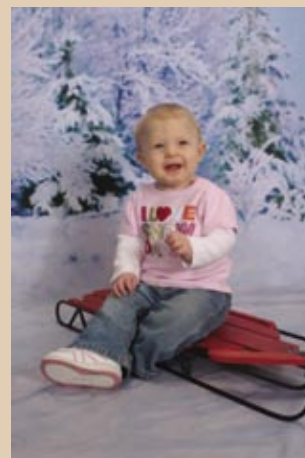
# Class of 2028



Brendyn Lloyd Casten, born July 23, 2006, to **Jon Casten '02**.



**Juan-Carlos Guerra '01** and wife Barbara announce the birth of their first child, Christian Antonio, on Aug. 27, 2006.



**Jen Ramsey Meredith '97** and husband Ryan welcomed baby Emma on March 30, 2006.



**Shawndra Lopez '06** welcomed Gavin Tate Lopez on Sept. 25, 2006, in Albuquerque, NM. Shawndra is an engineer with Telck-Hensley Engineering Group.



Christoph and **Tatiana Dueño Goss '00** announce the birth of their son, Markus, on Nov. 2, 2006.



**Wes '93** and **Kirsten Wynn Dickhut '93** welcomed Annelise to their family, joining Tia, Carl, Kurt and Barbara.



**Anna Gray Hanley '95** and **David Hanley '06** are proud to announce the birth of their daughter, Adeline Grace, whom they welcomed into the world on June 21, 2006.

Joy Emma Saugier, second child of **Amber Butler Saugier '02** and Luke Saugier, born Dec. 4, 2006.



**Rhonda Redin Gathers '95** and **Mike Gathers '94** announce the birth of son, Owen Riley, on December 5, 2006. Owen joins brother Kiley.

## 2005

**Benjamin Z. Anglen** is a project engineer for Nana/Colt Engineering. He lives and works in Anchorage, AK.

**Rachel Benson** is a process engineer for ATK Launch Systems in Brigham City, UT.

**Brynn M. Boyd** is a project engineer for Rhino Engineering, Inc. in Grand Junction, CO.

**Phillip D. Gentry** is a design engineer, structures, for Boeing in Everett, WA.

**Rachael Ann Hill** is an engineer for Anadarko Petroleum Corporation in Denver, CO.

**Lon A. Hutt** is a software engineer for Chenega Technology Services Corporation. He lives and works in Anchorage, AK.

**Evan P. Mosier** is a design engineer for Aerotech, Inc. He lives and works in Pittsburgh, PA.

**Adebola Olayinka Okeowo** is a lead research engineer in the Process Technology Unit for the Chevron Energy Technology Company in Richmond, CA.

**Alireza Roostapour** is a reservoir engineer for the Iranian Offshore Oil Company in Tehran, Iran. He lives in Shiraz, Iran. His e-mail is [aroostapour@iooc.co.ir](mailto:aroostapour@iooc.co.ir).

## 2006

**Sean M. Beary** is an associate software engineer for Intrado in Longmont, CO.

**Abbey P. Crowley** is a systems engineer for Northrop Grumman.



**Mehdi Izadi Kamouei** is a reservoir engineer for Norwest Questa Engineering in Golden, CO.

**Karl W. Kurbjun** is a customer applications engineer for Xilinx. He lives and works in Longmont, CO.

**Melissa L. Marts** is a graduate student at the Colorado School of Mines.

**Lauren N. Moody** works for Titanium Industries.

**Cameron K. Moyer** is a program manager for HACH in Loveland, CO.

**Grant W. Newton** is a design engineer for Vision Land Consultants.

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**For more information, contact the Managing Director, CSM Foundation Inc. Linda M. Landrum at (303) 273-3142**

**Jeremy H. Newton** is a major in the U.S. Army.

**Zachary A. Nylund** is a project manager for ExxonMobil Corporation.

**Brian C. O'Connor** is a CSM graduate student.

**Charles P. Oden** is a geophysicist for the U.S. Geological Survey in Lakewood, CO.

**Matthew N. Oedekeoven** is an engineer for Blasland, Bouck & Lee, Inc. (BBL) in Golden, CO.

**Cole A. Ones** is a gathering resources engineer for EnCana Oil & Gas in Denver, CO.

**Gaylor M. Ott** is an engineer for Carrol & Lange Engineering in Lakewood, CO.

**Ryan E. Pennington** is studying toward a graduate degree at Mines.

**Charles P. Pepe-Ranney** is a graduate student at Mines.

**Benito Perez** is a mining engineer for Phelps Dodge Corporation in Bagdad, AZ.

**Brooks L. Perry** is a project engineer for Chevron Phillips in Baytown, TX.

**Daniel M. Pyziak** is a production engineer for Occidental Oil and Gas Corporation.

**Paul G. Quinn** is a project professional for Vector Colorado LLC in Golden, CO.

**Daniel J. Rabiolo** is an engineer for EnCana Oil & Gas (USA) Inc. He lives and works in Denver, CO.

**Abdulrahman Raisi** is pursuing his PhD in chemical engineering at CSM.

**Shawn Reedy** is an engineer in training for Lafarge.

**Michael A. Rein** is an electrical engineer for ConocoPhillips in Orange County, CA.

**Derek Sarlo** notes, "I just recently obtained my second job as a mechanical engineer (HVAC) for the RMH Group in Lakewood, CO, and just recently became a LEED AP [Accredited Professional]."

**Brandon L. Segura** has recently moved to Albuquerque, NM, where he has accepted a position with a venture capitalist company, FlyWheel Ventures, as a market analyst.

**Scott A. Shuey** is a senior metallurgical engineer for the Phelps Dodge Corporation in Safford, AZ.

**Jennifer L. Smith** is a graduate student at Colorado School of Mines.

**Kirt S. Snyder** is a production engineer for Energen Resources in Farmington, NM.

**Megan M. Starr** is an operations engineer for the Devon Energy Corporation.

**Lisa M. Stice** is a construction engineer for JR Engineering, Ltd. in Greenwood Village, CO.

**Joshua T. White** is a graduate student at CSM.

**Phillip P. Zelenak** is a staff engineer for ARCADIS in Highlands Ranch, CO.

# Passings

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

—Thomas Campbell 1777-1844

**CESAR ALFREDO BORGES-OLIVIERI** '82 died on December 10, 2006, in Caracas, Venezuela. He leaves his daughter, Claudia Borges, his brother, Rafael Ernesto Borges-Olivieri '77 and his sister, Marietta Borges-Olivieri.

**PAUL B. DAVIS** '39 died on October 17, 2006, at Del Norte, Colo. After working in various hard rock mines in the early forties, Paul moved from Creede, Colo., to Del Norte in 1948. There he established Davis Engineering Service, which continues to provide land surveying and civil engineering services to the San Luis Valley and Archuleta County under the guidance of his son and grandson, Mick and Mike '90. He was widely known for his strong ethics, the quality of his company's work, his lively sense of humor and his love for the outdoors. A lifelong learner, Paul became an accomplished lapidarist in his later years and remained an avid reader until the time of his death. He leaves his wife, Marion; his two sons, Mick and Chris; and two grandchildren. His first wife, Edith, predeceased him.



**LAWRENCE E. DUBÉ** '41 died on December 25, 2006, in Sarasota, Fla. After working for Alcoa as a metallurgist, he joined Reynolds Metals where he served in several management positions before becoming president of Great Lakes Aluminum. Starting in the early fifties, he concentrated on aluminum extrusions, serving as a vice president for Kawneer, then as group vice president for Amax Aluminum and later as president of Amax Aluminum Extrusion Products. After retiring from his role as group vice president for Alumax, he became an avid and accomplished golfer, evidenced by his lifetime achievement of six holes-in-one. He leaves his wife of 27 years, Elizabeth; his son, Lawrence; and one grandson. His first wife, Rosemary, predeceased him.



**LYNN D. ERVIN** '40 of Lufkin, Texas, died on July 23, 2006. After graduating from Mines, he served with the U.S. Marine Corps during World War II, spending three years in the South Pacific where he commanded an anti-aircraft battery and participated in four campaigns from Guadalcanal to Guam. After retiring as a reserve lieutenant colonel, he served as a geophysicist for several oil companies, including his own seismic contracting firm in Oklahoma City. In 1977 he retired from Tenneco Oil Company in Houston as geophysical manager. He was active with the Society of Exploration Geophysicists both locally and nationally, and was similarly involved in the American Association of Petroleum Geologists. A member of St. Cyprian's Episcopal Church, he also enjoyed dancing, woodworking, reading and spending time with family and friends. He leaves his wife, Eunice; his daughter, Susan Rolle; his stepson, William Hatton; and four grandchildren and one great-grandson. He was predeceased by his son, Lynn Ervin Jr., and stepson, Jerry Hatton.



**JOHN N. GALBAVY** '82 died on October 27, 2006, in Coeur d'Alene, Idaho. After graduating from Niwot (Colo.) High School in 1977, he received a baseball scholarship to attend Colorado State University. After receiving his undergraduate degree from Mines in 1982, he served as a geophysicist for Arco Oil Company, while simultaneously studying at Denver University for a law degree, which he was awarded in 1989. He and his wife, Sandra, moved to Idaho in 1995. Most recently, he worked for Hecla Mining Company in Coeur d'Alene, Idaho, and Gold Reserve, Spokane, Wash. A devoted husband, father, brother and friend to many, he was active in church and community activities. He leaves his wife, Sandra; their three children, Alyssa, Connor and Blake; his sister, Roni Cichoski; and his brothers, Greg, Mike and Steve. He was predeceased by his parents and his sister, Catherine Galbavy.



**MARVIN E. GANTZ** '40 of Ligonier, Pa. died on August 28, 2006. A Denver native, he embarked upon a 43-year career with Alcoa after leaving Mines, starting as a metallurgist and ultimately serving as director and vice chairman before retiring in 1983. During his career he invented several patented manufacturing methods and processes, and he was responsible for turning Alcoa's Mill Products Division around from an annual \$6 million loss to earnings of \$300 million. Mines honored his exemplary professional accomplishments by awarding him the Distinguished Achievement Medal in 1971. He was director of the Pennsylvania State Chamber of Commerce and the National Association of Manufacturers, and served his local community as director of the Boy Scouts of America, Junior Achievement and the Allegheny Trails Council. He remained committed to Mines throughout his life, serving on several visiting committees and as a volunteer for the Resources campaign in the 1970s and 1980s. He enjoyed golf, cross-country skiing, fishing and hiking. He leaves his wife, Mary Louise; and his sister, Shirley Gantz.



**JOHN E. HOFFMAN** '57 of Golden, Colo. died on April 28, 2006. After growing up in Coon Rapids, Iowa, and serving in the Air Force, he came to Mines lured by the mountains and Mines' reputation. Upon graduating, he worked in the mining industry for many years, spending much of the time in South Dakota. After several years with the Bureau of Land Management in New Mexico, he returned to Golden. Among other organizations he worked for the U.S. Geological Survey and the Gates Rubber Company. Living near the campus, he frequently took his three children, and later his grandchildren, to visit the museum where he was able to share his extensive knowledge of mining and geology. He leaves his children, Dan, Katy DeBoer and Mike; eight grandchildren; and five great-grandchildren.



**ROBERT W. KNAPP** '40 died on October 11, 2006, in State College, Pa. After being hired by Alcoa shortly before graduation, he remained with the company for 38 years, serving in various management positions in Washington, Ohio, New Jersey and New York. In 1942 he married his high school sweetheart, Dorothy Swain, with whom he shared the rest of his life. A love

for the water and boats lasted throughout his life; he owned numerous vessels, including a cabin cruiser he built himself, a houseboat, a sailboat, several canoes and row boats. He was a member of St. John's United Church of Christ in Boalsburg, Pa., the Masonic Lodge of Vermont in South Hero, Vt., BPOE Elks, State College, Pa. and Tau Beta Pi. He leaves his wife, Dorothy; his son and daughter, Roy and Barbara; and one granddaughter.



**THOMAS S. LEE** '54 of Orange, Calif., died on September 14, 2006. Instilled with a value for education from an early age, he traveled from Boston to Golden to study at Mines. Shortly after graduation he entered the military and was stationed in San Francisco, where he met his future wife, Mary. After two years of service, he began a 40-year career with Northrop, based

in Southern California. Living in Orange, he became actively involved with the Orange County Chinese Cultural Club, serving as president from 1981 to 1983, and again in 2005. He was also treasurer for many years. He also served as secretary for the Asian American Senior Citizens Service Center, a social service organization for elderly Asian-Americans, which he and his wife founded together. He leaves his wife, Mary.



**MELVIN H. LEVY** '47 died on November 24, 2006, at the University of Pittsburgh Medical Center, Shadyside. As a young man growing up in Denver, he spent considerable time at the YMCA, becoming a nationally ranked handball player and a champion amateur boxer. During World War II he was stationed in Honolulu with the Navy, where he met his future wife, Eileen.

After graduating from the Colorado School of Mines, he spent six months working as a petroleum engineer in Casper, Wyo., before deciding to attend Georgetown University's law school. He clerked at the U.S. Tax Court, and after becoming a certified public accountant, he joined Ernst and Young first in Washington, D.C., moving to the Pittsburgh office in 1968. He became a partner with Buchanan Ingersoll in 1982, and went on to establish his own practice six years later. Mr. Levy served on numerous boards, including those of Oberg Industries, Elizabeth Carbide Tool and Die, and Standard Specialty Steel. He also served on the board of St. Francis Health System. He worked until the day he was admitted to the medical center. He was a member of St. Scholastica Church, the Pittsburgh Field Club, the Duquesne Club and the Boca West Country Club. He leaves his daughter, Dana Baldwin; a sister, Geraldine McCoy; and longtime companion, Lyndell Miller. He was predeceased by his wife, Eileen.



**ROBERT E. OSBORNE** '57 died on October 24, 2006, in New Orleans. A resident of Baton Rouge, he served in the U.S. Navy after high school, and then went on to earn a bachelor of science degree from Muhlenberg College in 1954, and later a master's from Mines. Employed by Chevron Corporation for 38 years, he held numerous positions in Louisiana, Texas,

Colorado and California. He advanced to chief development geologist for the corporation and was involved in projects throughout the United States, as well as Saudi Arabia, Russia, Indonesia and Nigeria. He was a member of American Association of Petroleum Geologists, Chevron Annuitants, Toastmasters and he participated in the Civil War Roundtable. An avid reader, he was also an active member of Great Books Discussion Group for many years. He enjoyed golfing, boating, traveling and spending time with his family. He leaves his wife of 56 years, Harriet Haag Osborne; two daughters, Kathleen Osborne Davis and Susan Osborne Scott; a sister, Jeanne Osborne Lynch; and four grandchildren. He was predeceased by his son, Robert Edward Osborne II.

**JOHN M. PETTY** '42 of Montrose, Colo., died on December 9, 2006. When he came to Mines from Texas, he embarked on a lifelong career in mining, much of which centered on the Rocky Mountains. He was part of the Mines team that researched the feasibility of producing oil shale as an energy source. He ran the Climax mine at the top of Fremont Pass and he opened Questa Molybdenum Mine in Questa, N.M. Taking him away from the mountains, he spent several years serving as general manager of O'Kiep Copper Company in Namaqualand, South Africa. While there, he and his wife, Margaret, were able to implement many hiring and social practices that led to better standards of living for the indigenous workers and their families—he ranked this as one of his most significant professional accomplishments. In 1970, he and Margaret moved to Ouray, Colo., where he served as general manager of Idarado. The mountains were not only the chief concern of his professional life, but they featured large in his recreational pursuits. John explored most of the Collegiate Range around Leadville and Climax during the forties and fifties, and he and his close friend, Jack Gorsuch, were the first to take a Jeep to the top of Mount Elbert. While at Climax, he joined together with several friends and built the Climax Ski Hill during his free time. An avid fly fisherman, he hiked to the bottom of the Black Canyon in the early forties in search of the perfect trout stream, a feat few had accomplished in those days. At the age of 85, while living in Montrose, he became a Master Gardener through the Colorado State University Extension Service. He leaves his daughter, Deedra; a brother, Carl; and one grandson. He was predeceased by his wife of 45 years, Margaret.



**WILLIAM CHARLES RUMP** '33 died at St. Mary's Hospital on September 23, 2006. He grew up on the Redlands near Grand Junction riding to school on horseback with his older brother. At Mines he played quarterback for the football team, was a member of the Beta Theta Pi fraternity and ROTC. In Golden he met Helen Burgess Gardner, whom he later married—a partnership that lasted 71 years. After graduating, he worked for Texaco Oil in Houma, La. Commissioned Second Lieutenant in the US Army in 1933, he entered active duty in the spring of 1942, serving as property officer and post engineer at a prisoner of war camp in Hearne, Texas. He was awarded the American campaign medal and World War II victory medal, and continued to serve as a reserve commission officer until 1972 when he retired as a lieutenant colonel. He worked for Biggs-Kurtz Enterprises in Grand Junction after the war, and managed the 350-acre Indian Rock peach ranch at Bridgeport assisted by his wife, Helen. Involved in uranium exploration and land development, he played a key role in designing and constructing the Bookcliff Country Club golf course in 1958, and he later partnered with his brother, John, to establish Easter Hill Associates which developed home sites on the Redlands. He and Helen enjoyed golfing, fishing and trailering with friends. He leaves his wife, Helen.

**MICHAEL C. SAVELL** '62 of Simi Valley, Calif., died on October 27, 2006. Fascinated with the history and lifestyle of the West, he worked the hayfields of Montana and briefly attended the University of Wisconsin to study agriculture. After serving as a sergeant in the U.S. Marine Corps, he moved to Colorado. It was there that he met and married Margaret Black, with whom he shared his life for 48 years. After graduating from Mines, he worked in petroleum exploration, real estate and instrumentation sales. As a small-business entrepreneur, he co-founded Dolphin Technical Enterprises. An active person, he loved being outdoors and was an avid skier. In addition to racing, he taught skiing in Colorado, Alaska and California, and he was a longtime member of the Far West Ski Instructors Association and Edelweiss Ski Club. Music, especially jazz, was a lifelong interest. As a guitar player, he was an engaging performer and often entertained friends and family with songs, stories and jokes. Most recently he was an active member of the Simi Valley Jazz Club. He leaves his wife, Peggy; three daughters, Becky, Shannon Beeler and Samia; three grandchildren; and his brother, Don.



**STANLEY B. SHAEFFER** '42 of Midland, Texas, died on January 8, 2007. While at Mines, he was a member of the 1939 undefeated championship football team. During World War II he served in the U. S. Navy as chief engineer of the "Black Gang" on several destroyers. He came to Midland in 1946 as a consulting geologist. He enjoyed countless hours with his boys engaged in various sporting activities, occasionally finding time to feed his own passion for fishing. He was also active in the Midland Community Theatre, building sets for a great many productions over a 50-year period. He leaves his three sons, Scott, Robert and Stanley; his five grandchildren; and his brother, Roger. He was predeceased by his wife, Frances.



**CHARLES L. SIMONDS JR.** '51 of Anchorage, Alaska, died on July 15, 2006, at Providence Alaska Medical Center. From 1951 to 1953, Charlie served with the U.S. Army Corps of Engineers as a first lieutenant stationed at Harmon Air Force Base in Newfoundland. There he met and married Philomena. His 31-year career with Atlantic Richfield Oil Company took him first to Southern California, where he simultaneously earned a master's degree at the University of Southern California and served on the board of directors at Santa Maria College. In 1968 he was transferred to Anchorage with the company. After retiring in 1985, Charlie and Philomena bought and operated the Indian House Restaurant in Indian, Alaska, until 1992. He later drove school buses for Laidlaw. During his retirement Charlie enjoyed time with his wife and family, taking care of his garden and raspberry bushes, and dispensing his characteristically sage advice to the many who sought it. He leaves his wife of 53 years, Philomena; his children, Mary Shields, Michael, Kathleen Stratigos and Kevin; twelve grandchildren; eight great-grandchildren; four step-great-grandchildren; and his sister, Hazel Dickey.

**ALBERT SMALL** '42 of Philadelphia, Pa. died on December 7, 2006. During World War II he served as an officer in the Army Air Corps as a meteorologist and air traffic controller, being stationed in the U.S., Africa, the Middle East and Germany. During this time he attended New York University School of Engineering and the Civil Aeronautics Authority Air Traffic Control School. After the war, he worked for Atlantic Manufacturing Company until 1961, before going on to fill a variety of positions as a consultant and engineer. After retiring in 1990, he developed a second career as a licensed bonded locksmith. An active community member, he served as president of the Philadelphia Tool and Die Association, and adjutant and commander for American Legion Post 993. A Mason for over 50 years, he was a member of the Equity Lodge 591 and was active in the Jewish War Veterans Post 176. He leaves his wife of 59 years, Mitzi; three children, Meryl Latsko, Linda Plotnick and David; six grandchildren; and his brother, Arnold.

**LOUIS WAGEMAN** '96 died at Hospice of Metro Denver in Aurora on March 19, 2004. A husband and father of seven, he worked as an engineer until shortly before his death. He was interested in alternative sources of energy, primarily wind and solar. For 14 years he was married to his high school sweetheart, Anna Edgerton, and dearly valued time with his family. He leaves his wife, Anna; his children, Liberty, Hope, Olivia, Thomas, Trevor, Jonathan and Ezra; his mother, Edna; his sister, Ann; his half-brothers Joshua, Charles, and Jared; and his stepmother, Pam. He was predeceased by his father, Robert.

### Also Remembered:

- |                          |                   |
|--------------------------|-------------------|
| Verne E. Hooker '50      | November 2004     |
| Larry O'Brian '51        | May 21, 1997      |
| Blecker R. Williams, Jr. | November 13, 2006 |

## Going from Point A to Point B

By Andrew P. Schissler '75, PhD '02



Since 1975 I have managed mining operations and engineering departments, taught at Penn State University, been in the trenches selling mining equipment and provided consulting engineering services. My present position as engineering manager includes utilizing formalized business process improvement tool sets (circa Six Sigma) to better safety, productivity and cost control at the largest potash producer in the United States. These toolsets—which include high-performance process improvement teams, benchmarking, best-practices, operations measurement and follow up—are extremely effective because they involve the true process experts in mining—the miners who work directly in an operation. The miners, by bringing forth ideas, receive the satisfaction and recognition of personally increasing the performance of an operation.

Of all lessons learned in a career, one surely predominates: achieving the goal usually does not follow a straight line, but rather a line connecting with and through people. Everyone can remember unfortunate instances when personal interactions resulted in less than positive outcomes—times one found oneself saying, “I wish I would have said or done this.” Interpersonal skills can create or kill opportunity. And with a conscious effort, anyone can improve their people skills. The right-brain left-brain theory that says a genetic predisposition exists for some people to be better at interpersonal skills than others is overrated. As always with engineering education, the challenge remains how to structurally incorporate such skills into a curriculum.

What to do? The simple truth is that the interpersonal skills learned in grade school still apply:

- Listen, and don't interrupt;
- Show courtesy and respect;
- Read, write, and add as best you can;
- Clean up after yourself;
- Give;
- When working in a team, the least important word is “I”; the most important is “we;” and
- Consider others and yourself valuable.

These values are at the core of the highly successful systems I work with every day—systems that boost productivity, improve retention, and create a happier and more successful workforce. And engineers who have accomplished great things also embrace these principles because, no matter what the journey, it always involves people.

---

*Andy Schissler received a BSc degree in mining engineering in 1975 and a PhD in mining and earth systems engineering in 2002. Currently, he resides in Carlsbad, N.M., and is employed as an engineering manager for Intrepid Potash – New Mexico LLC.*





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